A303 Sparkford to Ilchester Dualling Scheme TR010036

5.11 Annex J: S46 Letter and Enclosures sent to PINS

APFP Regulation 5(2)(q)
Planning Act 2008
Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009
July 2018

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Infrastructure Planning

Planning Act 2008

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

A303 Sparkford to Ilchester Dualling Scheme

Development Consent Order 201[x]

ANNEX J: S46 Letter and Enclosures sent to PINS

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A303
Sparkford to Ilchester Dualling Scheme
Statutory Public Consultation

26 January – 9 March 2018

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Foreword

Thank you for taking an interest in our proposal to upgrade the A303 between Sparkford and Ilchester to high quality dual carriageway. This is part of the Government's programme of schemes to improve connectivity between the south west and London and the south east. The purpose of the scheme is to improve safety, relieve congestion and support economic growth.

In February last year we conducted a route options consultation on our proposals for dualling the A303 between Sparkford and Ilchester. Based on the feedback you provided we announced a preferred route on 24 October 2017.

This consultation is your opportunity to express your views on the design of the proposed scheme in advance of our application for a Development Consent Order (DCO) to authorise construction of the project. Businesses, local authorities, public bodies, road users and the communities and neighbouring areas can all play an important part in the development of the scheme. Your feedback is therefore essential to this consultation as it will enable us to improve the proposal before we submit our planning application.

This booklet summarises our proposal, explains where you can find more detail and how you can let us know what you think about our plans.

The consultation runs from Friday 26 January until Friday 9 March 2018. Further information on our proposal, including a link to the preliminary environmental information as well as the online consultation questionnaire, can be found on our scheme website:

www.highways.gov.uk/Sparkford-to-Ilchester

Nick Aldworth
Regional Delivery Director (south west)

About Highways England – what we do

Highways England operates, maintains and improves England's motorways and major A-roads, the strategic road network. Our network totals around 4,300 miles, and while this represents only 2% of all roads in England by length, these roads carry a third of all traffic by mileage and two-thirds of all heavy goods traffic.

England's strategic road network forms the economic backbone of the country, is open 24 hours a day, 7 days a week, and is relied on by communities and businesses to get from A to B.

We aim to ensure that all our major roads are dependable, durable and most importantly, safe. In pursuit of that aim, we are delivering a £15 billion investment programme in our network as described in the Government's **Road Investment Strategy** (RIS), see **www.gov.uk/government/collections/road-investment-strategy**.

This A303 Sparkford to Ilchester Dualling Scheme is part of this investment programme.

The consultation process

The proposed scheme is categorised as a Nationally Significant Infrastructure Project (NSIP) under the Planning Act 2008. As such, we are required to make an application for a Development Consent Order (DCO) in order to obtain planning permission to construct the scheme.

This consultation exercise is a prescribed process as set out in the Planning Act 2008. It requires the developer of a proposal – in this case Highways England – to consult with statutory bodies, local authorities, landowners, those significantly affected by the proposal and the wider community. Consultation is intended to provide everybody with the opportunity to comment in detail on our proposal - including the route, engineering, environmental, construction and land-take impacts of the proposal – before we submit our DCO application.

All feedback received from this consultation exercise will be used to help shape our proposal ahead of a DCO application.

We have worked closely with local authorities in the area to define how we will undertake consultation with local communities, including hard to reach groups, and this is set out in our Statement of Community Consultation (SoCC). In addition to the SoCC, we have published a statutory notice under Section 47 and Section 48 of the Planning Act 2008, which was published in local and national papers to notify the wider public about the proposal.

Background

The A303/A358 corridor provides vital connectivity between the south west with London and the south east for people, communities and businesses, including the tourism industry which is so important to the south west. But there are problems along the route.

In particular there are 6 single carriageway sections where road users can suffer congestion and long delays. The problems are even worse at peak holiday times during the summer months and on weekends. These problems on this strategic road overspill onto the local road network and impact on the communities in the area.

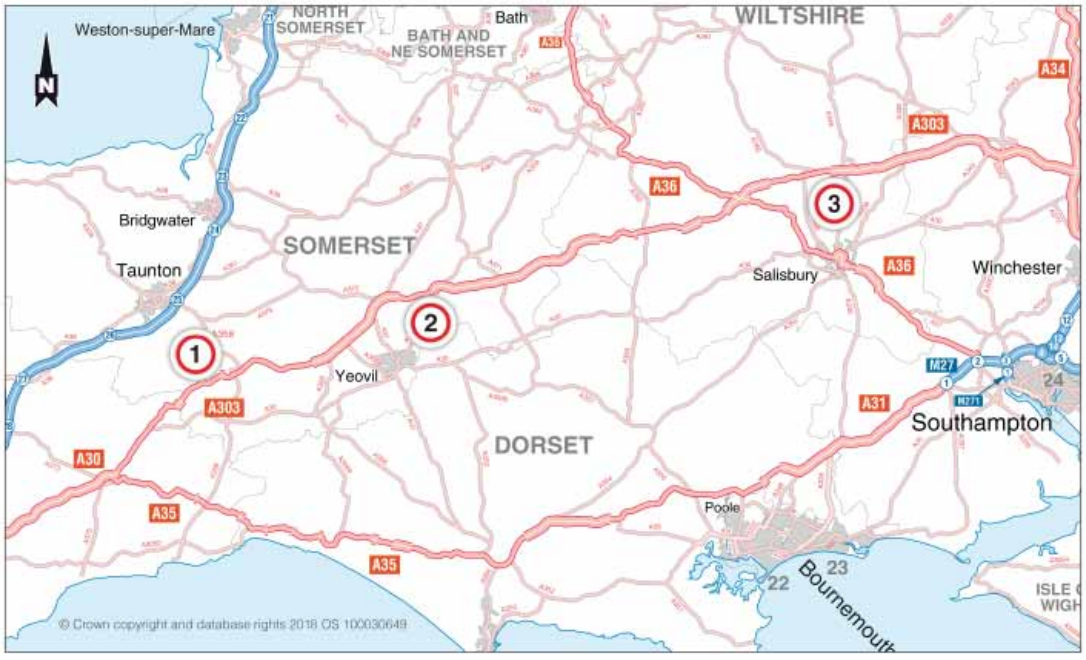
In recognition of this and the harmful effects this has on the south west's economy, the Government's **Road Investment Strategy** (RIS) sets out the intention to transform connectivity by upgrading the A303/A358 corridor to a high quality dual carriageway from the M3 motorway to the M5 motorway at Taunton.

A high quality dual carriageway is a road with typically limited local road access and no right-turning movements across it, thereby providing a level of service approaching that which is found on a motorway, where mile-a-minute journeys are the norm. To support this, we are developing the first of 3 major road improvement schemes along the A303/A358 corridor:

1. A358 Taunton to Southfields
2. A303 Sparkford to Ilchester
3. A303 Stonehenge, Amesbury to Berwick Down

You can find out more about the A303/A358 corridor plans by reading our booklet **'Creating an expressway to the south west - The case for the A303/A358 Corridor'**, available on our webpage and at our consultation events.

Figure 1: A303 /A358 route corridor schemes in RIS period 2015-2020



A303/A358 route corridor schemes

Why we need the scheme

The section of the A303 between Sparkford and Ilchester comprises of a mix of dual and single lane carriageway. This leads to localised congestion, impacting adversely on journey times and journey time reliability.

On a normal day, up to 23,500 vehicles use this single carriageway section. Due to higher volumes of traffic during the summer months and in particular at weekends, average travel times increase on a Friday in August, making it impossible to predict the time a journey will take.

This traffic is forecast to further increase as local authorities along the length of the corridor seek to deliver economic growth and new development.

The mixture of single and dual carriageway on the section of the A303 between Sparkford and Ilchester presents the following issues:

- poor junction visibility
- slow moving agricultural vehicles
- limited opportunities for overtaking
- increasing traffic levels outgrowing the capacity of the existing road design during peak periods

The consequences of these issues are:

- congestion and longer journey times during peak times and the summer months
- unreliable journey times
- queueing at the junctions due to the interaction between local and strategic traffic
- increased risk of incidents causing delays to surrounding local routes

Scheme objectives

Highways England is developing a scheme to address the need for improvement to this section of the A303, which has been clearly identified as part of the Government's Road Investment Strategy for improving connectivity to the south west.

Within that context, we have set ourselves a number of objectives for the scheme, which are:

- **Capacity:** Reduce delays and queues that occur during peak hours and at seasonal times of the year
- **Safety:** Improve the safety of the network by providing additional capacity, reducing driver stress and enabling safer access to and from the motorway. It will also improve the non-motorised user (NMU) routes in the area
- **Environment:** Avoid unacceptable impacts on the surrounding natural and historic environment and landscape and optimise opportunities for enhancement
- **Local communities:** Reduce community severance and promote opportunities for improving their quality of life
- **Support economic growth:** Facilitate growth in jobs and housing by providing a free-flowing and reliable connection between the south east and the south west
- **Connectivity:** Improve the connectivity of the south west to the rest of the UK and improve business and growth prospects
- **Resilience:** Improve journey time reliability and resilience, and provide extra capacity to make it easier to manage traffic when incidents occur

Developing the scheme

During our route options consultation, we asked for your views on 2 shortlisted options for improving this section of the A303 between Sparkford and Ilchester:

- **Option 1:** A dual carriageway that follows the existing A303 from east of Podimore Roundabout to Downhead. At this point, the road moves north before reverting to follow the route of the existing A303 in the direction of Hazlegrove
- **Option 2:** A dual carriageway that starts east of Podimore Roundabout before leaving the existing A303 to pass south of Annis Hill and then north of Steart Hill. It re-joins the existing A303 near Sparkford. The single carriageway section of the existing A303 would be retained as a local route

As well as listening to the consultation feedback, we continued to refine and further develop the design and undertake more surveys, including examination of the ground conditions, measuring the topography of the land, archaeological surveys and various environmental surveys. These included studies into the landscape and ecological impacts of each option.

We considered a number of factors in deciding between the options, including:

- scheme objectives
- safety
- economic benefits
- public consultation feedback
- costs
- environmental effects
- construction

Our assessment and feedback from the consultation demonstrated that Option 1 would on balance provide the better performing route, by reducing new construction in rural countryside, having a lesser environmental impact and providing the better journey time.

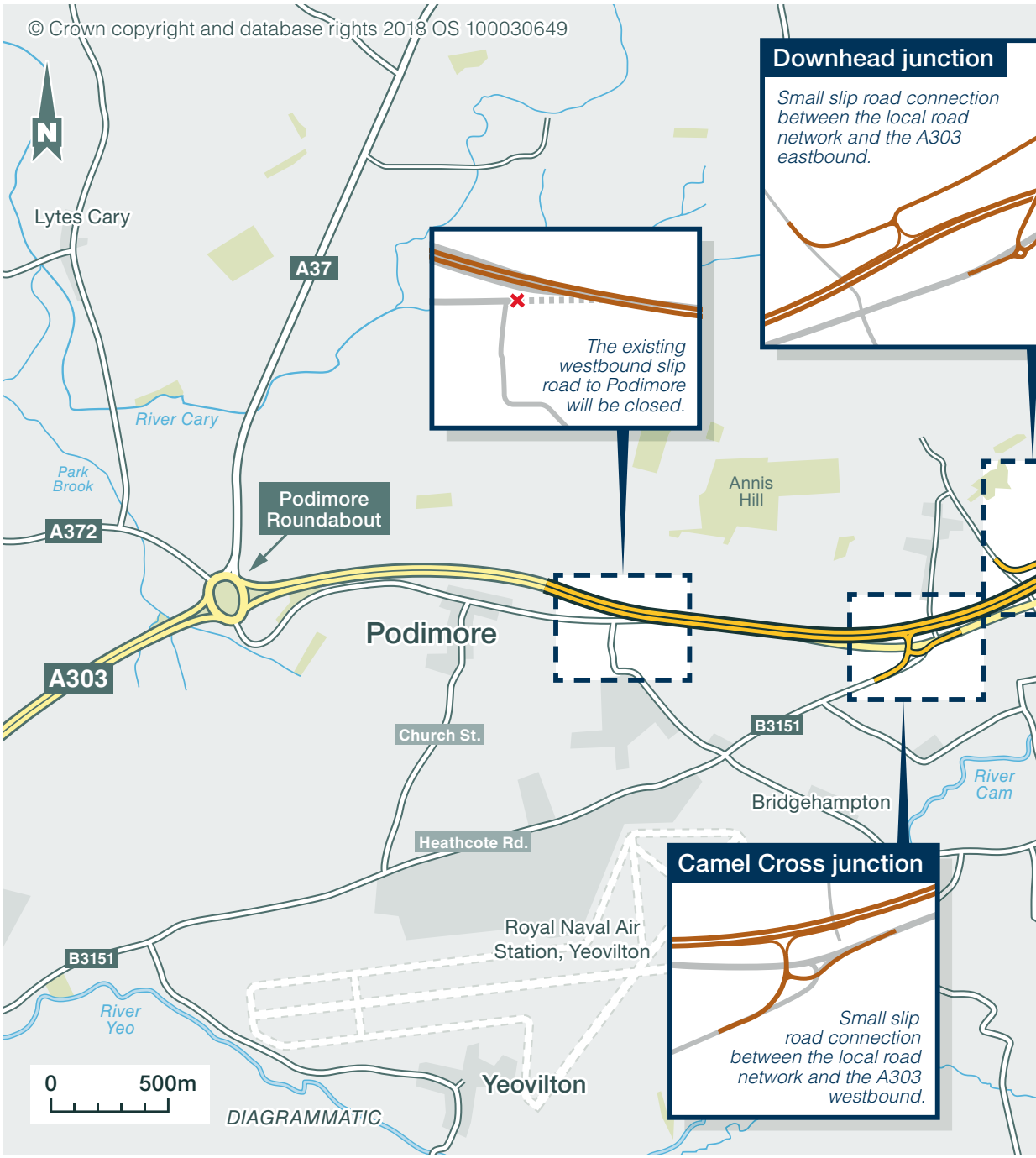
Details of our preferred route, which we announced on 24 October 2017, are available on our webpage.

Scheme proposal

Since announcing the preferred route, we have continued to develop our scheme proposal and we are now in a position to present this next stage of scheme development as part of a statutory consultation, in accordance with the Planning Act 2008.

Our proposal is for a dual carriageway that starts east of Podimore Roundabout and follows the alignment of the existing A303 to Downhead.

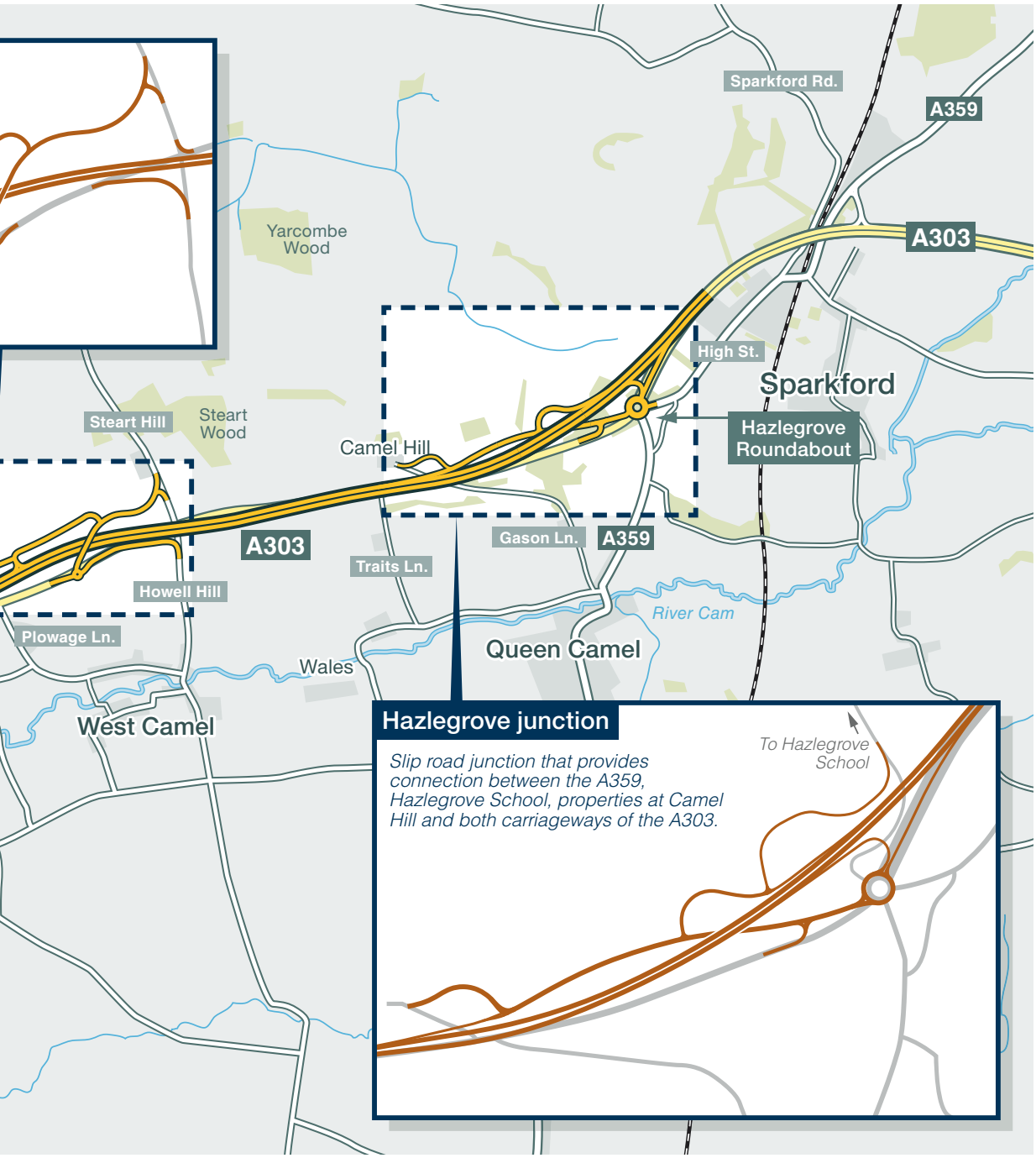
Travelling eastwards, the route moves north of the existing A303 single carriageway, allowing the existing road to be retained for use as a parallel local road in this section.



The route then rises up West Camel Hill before crossing over the existing A303 at the junction with Steart Hill/Howell Hill. The route then takes a southerly alignment briefly before meeting up with the existing road again to pass between Vale Farm and the MOD signal station at Eyewell/Traits Lane.

Finally, the route then bypasses the existing Hazlegrove Roundabout to the north through the Registered Park and Garden associated with Hazlegrove House, before tying into the existing A303 Sparkford Bypass.

Figure 2: The route



About the junctions

Hazlegrove

We are proposing a new split level junction at Hazlegrove, as shown in figure 3. The new junction design keeps the existing Hazlegrove roundabout to maintain access to the communities to the south and the A359. It includes a new bridge under the new A303 dual carriageway allowing access to Hazlegrove House and properties to the north at Camel Hill.

Our proposal for this junction takes into account the significant amount of feedback we received regarding this junction during the route options consultation.

In question 5 of the consultation questionnaire we ask for your views on this junction layout.

Figure 3: Proposed junction at Hazlegrove

Downhead Lane

Following feedback from the route options consultation, we have considered a number of different options for connecting with the local roads at Downhead, including:

- a split level all-movements junction allowing people to travel in any direction
- a limited access junction, which would be smaller but would only allow people to travel in certain directions
- no junction with the local roads

We have chosen a junction allowing access in any direction, as feedback from the last consultation told us that this is how people are likely to find it most useful and it provided economic benefit.

Figure 4 shows the proposed layout for a junction at Downhead. The new junction will use a proposed bridge over the dual carriageway near Steart Hill, allowing vehicles to join and leave the A303 in all directions and to travel north and south across the proposed dual carriageway. The junctions at Downhead will also maintain access to the B3151 and the section of the existing A303 that will be kept for local access.

In question 6 of the consultation questionnaire we ask for your views on this junction.

Figure 4: Proposed junction at Downhead

Further design work

Since the route options consultation and preferred route announcement in 2017, we have also continued to develop our overall proposal and have made a number of changes. We have moved the proposed new dual carriageway section between Podimore and Downhead Lane to the south slightly to align more closely with the existing single carriageway section.

We have also removed a proposed underpass at Traits Lane which we had included as part of the route in the route options consultation. At the time, this was proposed for local road access, maintaining a link to the north of the A303 which would otherwise have been severed.

We have carried out more work to understand what the underpass would involve, and found that:

- people living near the potential underpass did not feel it was required
- we are able to maintain local access to the north of the A303 via the new Hazlegrove junction, meaning this underpass is not needed
- we can provide more effective wildlife crossings elsewhere
- the cost and difficulty of building the underpass would not be justified by its limited benefit

For these reasons, we are no longer proposing an underpass at this location.

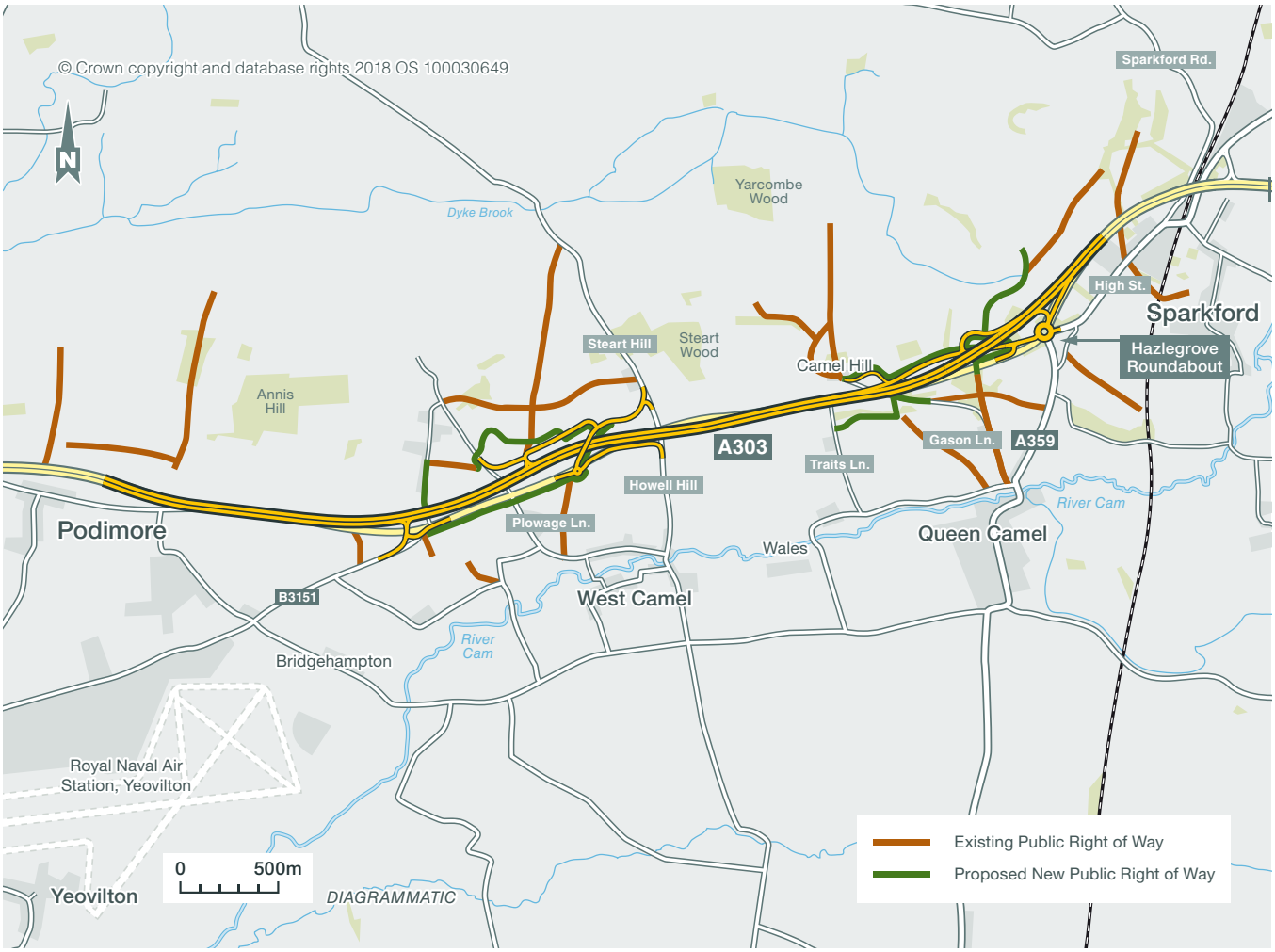
Provision for non-motorised users

We need to ensure that the design of the scheme allows people travelling on foot, bicycle or by horse to continue to get around the area. We have carried out surveys to identify the most frequently used routes that would be affected by the proposal. As part of this, we have considered how people with disabilities currently get around the area. We have engaged with a number of community groups to ensure we fully understand what is important to them and those that they represent. For safety reasons, pedestrians, cyclists or equestrians should not be allowed to directly cross the dual carriageway.

Based on this information, we have included in our proposal crossing points that use new bridges over the dual carriageway or underpasses beneath the dual carriageway to keep the access for these routes. These crossing points would be safer than the existing situation. This proposal is shown in figure 5.

Question 7 of the consultation questionnaire asks for your views on our proposal for pedestrians, cyclists and equestrians.

Figure 5: Proposed crossings for pedestrians, cyclists and equestrians



What our proposal means for you

We are committed to making sure our proposal brings long-term benefits for local communities, for regional growth and for national strategic traffic, at the same time as managing the impacts of development. This is supported by our continuing work with stakeholders including councils, statutory environmental bodies, businesses, specialist organisations, community representatives and user groups.

Transport

The scheme will have significant transport benefits, including:

- **Capacity:** The proposal will reduce congestion, by increasing the road's capacity for free-flowing traffic and making mile-a-minute travel the norm
- **Safety:** The proposal will boost road safety and ease driver stress. It will also make it safer and easier for cars, pedestrians and other local road users to reach facilities
- **Resilience:** There will be fewer road closures due to incidents or accidents

Economic growth

Economic benefits from the scheme include:

- enabling growth across the whole of the south west region, by making trips quicker and safer, and arrival times easier to predict
- making the south west more attractive for tourists and commerce, by making it an easier place to visit and do business
- raising the south west's productivity by creating world-class connections to other UK regions
- supporting the predicted growth in jobs and housing by increasing the capacity of the strategic road network

Caring for the environment

Understanding the impact on the environment and the community within the A303 corridor is very important to us. Our aim is to reduce any adverse effects while capturing the wider opportunities for improvement created by this scheme.

The area surrounding the A303 between Sparkford and Ilchester has a number of sensitive and valued environmental sites, as well as a number of dwellings and farm businesses. We have prepared a Preliminary Environmental Information (PEI) Report to help local people understand the potential environmental effects of our proposal. This is available on our website at **www.highways.gov.uk/Sparkford-to-Ilchester**

Impacts we have considered include:

- **Air quality:** We will put in place measures to mitigate potential impacts on air quality during construction and once the road is open to traffic. During construction, well established industry best practice controls will be implemented on site which would reduce the impact of emissions on residents and the local area and prevent nuisance to residents. While we do not expect there to be significant impacts on air quality once the road is operational, we will carry out further assessment work including at Stockton Wood and Down Site of Special Scientific Interest (SSS).
- **Noise and vibration:** The existing route currently passes adjacent to 2 Noise Important Areas. We will undertake noise surveys and continue to assess any potential noise and vibration impacts, to allow us to build in appropriate mitigation by design. During construction, mitigation may include the selection of the most appropriate method and machinery to reduce noise, adequate maintenance and storage of construction equipment and local noise screening. To help reduce noise levels from road traffic once the road is open, we will incorporate noise fences or bunds into the design. As a result, we do not expect the proposal to have a significant effect on noise and vibration.
- **Cultural heritage:** We are conducting archaeological surveys along the route to identify any risks that we may disturb significant remains during construction. The surveys will help us to determine what approach we need to take during construction to reduce risks to archaeological remains. We will produce a specific Conservation Management Plan to understand and mitigate our impact on the Hazlegrove House (Grade II Listed) Registered Park and Garden. The scheme has also been designed so that there is no encroachment of the Scheduled Monument located to the north of the existing A303 at Camel Hill.
- **Landscape and visual impacts:** Without mitigation the scheme would have an impact on a number of significant sites including the Hazlegrove House (Grade II

Listed) Registered Park and Garden and Conservation Areas in West Camel and Queen Camel, as well as other aspects of the local landscape. During construction mitigation measures such as keeping a well ordered and tidy site and limiting works to daylight hours will be included. To reduce the visual impact of the road once it is open to traffic we plan to drop the level of the road in a cutting. We will also create screening from native tree species to conceal the road, including areas in the southern third of the Hazlegrove House (Grade II Listed) Registered Park and Garden. Where the proposed road is on embankment, we will look to utilise a false cutting to reduce views of traffic on the road, particularly to the north of West Camel.

- **Nature conservation:** We have been carrying out ecology surveys and have identified the presence of bats, great crested newts, reptiles and badgers. Designated sites within the vicinity of the scheme include a number of Local Wildlife Sites, and habitats present include ancient woodland, broadleaved semi-natural woodland, species-rich hedgerows and calcareous grassland. We will use best practice mitigation measures to reduce the risk of impacts on designated sites, protected species and habitats. Measures during construction include the sensitive timing of work to avoid breeding seasons, directional and low-level lighting, and the sensitive location of construction machinery with all vehicles switching off their engines when stationary. Once operational, mitigation measures will include the creation of replacement habitat for great crested newts and reptiles, planting of new hedgerows, trees and scrub, and the provision of mammal underpasses.
- **Road drainage and the water environment:** To prevent pollution from surface water runoff, during construction we will use best practice mitigation measures including the storage of liquids, soils and powders appropriately away from the drains and waters, and in secondary containment.
- **Flooding:** To prevent an increase in flood risk, we will implement a sustainable drainage systems design. To support this, a flood risk assessment is being undertaken to inform the designs of the surface water drainage system that meets the requirements of the National Policy Statement for National Networks.
- **Geology and soils:** During construction, best practice mitigation measures will be implemented including measures to protect soil structure and quality, minimise waste generation, protect controlled waters from both general site works and foundation works, manage excavations and dewatering.
- **Materials:** We will reduce the amount of materials needed and waste produced by reusing soil materials onsite wherever possible. In addition, materials to be used onsite will, where possible, contain high proportions of recycled content. Our proposal will generate waste during construction which will need to be appropriately managed. To do this, a site waste management plan will be prepared in advance of construction, which will consider the sourcing, transport and use and disposal of waste materials in a sustainable manner.
- **Local communities:** We need to consider effects on local communities both during construction and once the new road is open to traffic. Before construction starts, we will develop a community relations strategy setting out how we will work alongside the local community to reduce disruption.

- **Cumulative effects:** Cumulative effects can result from the impacts of multiple projects, or from a number of different impacts from a single project, accumulating to affect a single environmental resource or area. We are aware of the need to understand potential cumulative impacts from other schemes proposed for the A303/A358 corridor. We are working across the corridor to understand the joint impact and how this can be reduced.

Following this consultation, we will prepare an Environmental Statement setting out in full our assessment of the potential effects of the scheme on the environment, and our proposed mitigation and enhancement measures. We will also produce a Construction Environmental Management Plan of how the mitigation and enhancement measures will be incorporated into our construction stage. We will submit these as part of our Development Consent Order application.

Question 8 of the consultation questionnaire provides an opportunity to share your views on our approach to environmental impact.

Planning for construction

We understand that local people will want to know the likely impact that building the scheme will have on their daily life, particularly in relation to traffic re-routing through local villages. A traffic management plan will be drawn up once the scheme proposals are finalised, together with a construction phase plan, detailing exactly how the works will be undertaken and how A303 and local traffic will be managed.

Community and environmental impacts will be taken fully into account at all stages of the development, planning and decision-making process. That means working closely with local communities, local authorities, environmental bodies and major employers as work progresses in continuing the development of the scheme into the construction phase.

Timing and phasing of construction works

If development consent for the proposed scheme is granted, construction of the main works would be expected to commence in spring 2020 and continue for a period of approximately 2.5 years.

Construction phasing arrangements would be developed to mitigate disruption to road users and the surrounding community during the period of construction. The safety of vulnerable road-user groups such as pedestrians and cyclists would be a particular consideration.

Site compounds and use of public roads

Working areas close to the proposed scheme would be required for site compounds, the storage of materials and equipment. The location of site compounds will be identified in our Development Consent Order application, together with proposed access and egress arrangements. Contractors will also need to use public roads to gain access to working areas. We will work closely with Somerset County Council to identify the routes that are appropriate and any restrictions that may apply.

Stakeholder engagement

Liaison officers will be appointed as a point of contact for the local community, businesses and other stakeholders during the period of construction to help address any concerns or issues as the scheme is built.

Regular scheme progress updates will be provided via the scheme website, social media, as well as regular updates via post and one-to-one meetings with interested parties.

What happens next

This is your opportunity to give your views on our proposal. If, after reading this booklet, you have further questions or would like to find out more, please come to one of our exhibition events, details of which are available on our website.

- **Visit our website at:** www.highways.gov.uk/Sparkford-to-Ilchester
- **Email us at:** A303SparkfordtoIlchesterdualling@highwaysengland.co.uk
- **Call us on:** 0300 123 5000
- **Write to us at:**
  A303 Sparkford to Ilchester Project Team
  Highways England
  2/07K Temple Quay House
  2 The Square
  Temple Quay
  Bristol BS1 6HA

Tell us what you think

When you are ready to give us your views please fill in and send us your completed consultation questionnaire. You can complete it online or download and print it from our website.

If you would like a hard copy, let us know and we can send one in the post to you. If you complete our questionnaire in paper format, please return it in the prepaid envelope provided or post it to:
Freepost HIGHWAYS CONSULTATION

The statutory consultation will run from Friday 26 January 2018 until 23:59 on Friday 9 March 2018 (inclusive). Please get involved and provide your responses by the closing date.

We will analyse your feedback, consider all suggestions made, and respond to it in the report we prepare on the consultation. Following the consultation, amendments can be made to the proposal. Your views will help the Secretary of State for Transport make a decision on our application.

Timeline and Development Consent Order process

This scheme is classified as a Nationally Significant Infrastructure Project (NSIP) under the Planning Act 2008. Because of its national significance, the scheme needs a Development Consent Order (DCO).

Following this statutory consultation, we will carefully consider all comments received before submitting our DCO application.

If the application is accepted by the Planning Inspectorate, there will then be an examination of the application in which the public can participate. This examination will take a maximum of 6 months. The Planning Inspectorate then has 3 months to make a recommendation to the Secretary of State, who then has a further 3 months to make a final decision. More information about the DCO process can be found on the Planning Inspectorate's website: **http://infrastructure.planningportal.gov.uk**

Sparkford 2
Wincanton 9½
Babcary 2¾
West Camel ½
Olympus

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highways england

A303 Sparkford to Ilchester Dualling Scheme

Statutory Consultation Questionnaire

26 January – 9 March 2018

A303 Sparkford to Ilchester Dualling Scheme

Statutory Consultation Questionnaire

Highways England is consulting on its proposals to upgrade the A303 between Sparkford and Ilchester to a high quality dual carriageway. The improvement is needed to relieve congestion and improve the safety performance of one of the busiest stretches of the A303/A358 route corridor that connects the south west and London and the south east.

In February and March last year we conducted a route options consultation on proposals for dualling the A303 between Sparkford and Ilchester. Following the consultation we continued to refine the design in conjunction with surveys and announced the preferred route on 24 October 2017.

This consultation is your opportunity to express your views on the design of the scheme in advance of our application for a Development Consent Order (DCO) to authorise construction of the project. Businesses, local authorities, public bodies, road users and the communities and neighbouring areas can play an important part in the development of the scheme design. Your feedback is therefore essential to this consultation as it will enable us to improve the scheme before we start the planning process.

This questionnaire is to help you give us your detailed feedback on our proposal.

What we are consulting on:

- Your detailed views on the overall proposal, the need for new junctions and road layout.
- Any other opinions, issues or concerns that you wish to raise about the scheme.

More information about our proposal can be found by:

- Attending one of our public consultation events, where information about the scheme proposal will be on display and you will be able to meet with members of the project team.
- You can also view all the consultation material online through our scheme website: www.highways.gov.uk/Sparkford-to-Ilchester. This includes:
  - The consultation brochure
  - Preliminary environmental information
  - The preferred route announcement leaflet
  - The Scheme Assessment Report
  - Consultation Report (route options stage)
  - The scheme route map

How to tell us your views

Please complete this questionnaire online at: www.highways.gov.uk/Sparkford-to-Ilchester

Or if you prefer to complete this questionnaire in paper format, please return it in the prepaid envelope provided or post it to: **Freepost HIGHWAYS CONSULTATION**

The statutory consultation will run from 26 January until 9 March 2018 (inclusive). Please get involved and provide your responses by the closing date.

Data Protection

We will be required to make consultation responses available to the Planning Inspectorate. We will however ensure that personal details are not placed on the public record. Personal details will be held securely in accordance with the Data Protection Act 1998 and will be used solely in connection with the consultation process and the development of the scheme.

The information you provide will be kept in a secure environment only accessible by Highways England and the specific contractor(s) working with us on this project. Your personal information will not be shared with any other individuals or organisations, beyond the provisions set out in the provisions of the Freedom of Information Act 2000, the Data Protection Act 1998 and Environmental Information Regulations 2004. The information you submit will only be used in support of the purpose specified in the survey. Personal details are collected only to ensure entries are not duplicated and in order to contact correspondents if necessary. All personal details will be deleted at the end of the survey analysis period.

Please complete the following sections:

About you

Please provide us with your name and address. If you would prefer your comments to be anonymous, please just let us know your postcode. If you are responding on behalf of a business or organisation, please provide details of the organisation you represent.

Name: .....

Address: .....

.....

.....

..... Postcode: .....

Email: .....

Are you responding on behalf of an organisation?

☐ Yes ☐ No

If Yes, please name the organisation:

Organisation: .....

1. How do you use the A303 between Sparkford and Ilchester if at all?

- ☐ I use the A303 between Sparkford and Ilchester as part of a longer route along the A303.
- ☐ I use the A303 between Sparkford and Ilchester for local trips in and around the villages.
- ☐ I live locally to the A303 between Sparkford and Ilchester but do not use it.
- ☐ I do not live locally and do not use the A303 between Sparkford and Ilchester.

2. How does the improvement to the A303 between Sparkford and Ilchester affect you?

- ☐ Local resident
- ☐ Business owner
- ☐ Employed locally
- ☐ Land owner
- ☐ Other (please state)

.....

.....

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.....

.....

3. What is your working status?

- ☐ Employed full time / part time
- ☐ Looking after the home
- ☐ Student full time / part time
- ☐ Unemployed
- ☐ Retired
- ☐ Prefer not to say
- ☐ Other (please state)

.....

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.....

4. Please provide the postcode for your home and workplace (This information helps us to understand where you live and work in relation to the scheme. It is not used to identify individuals and will be treated in accordance with the Data Protection Act. There is more information at the back of this document.)

Home postcode.....

Work postcode .....

Design

5. To what extent do you agree with our proposal for the Hazlegrove junction?

- ☐ Strongly agree
- ☐ Tend to agree
- ☐ Neither agree nor disagree
- ☐ Tend to disagree
- ☐ Strongly disagree
- ☐ Don't know

Please provide any comments in support of your answer to question 5:

.....

.....

.....

.....

.....

6. To what extent do you agree with our proposal for the junction in the vicinity of Downhead Lane, built on two levels?

- ☐ Strongly agree
- ☐ Tend to agree
- ☐ Neither agree nor disagree
- ☐ Tend to disagree
- ☐ Strongly disagree
- ☐ Don't know

Please provide comments in support of your answer to question 6:

.....

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7. To what extent do you agree with our proposals providing for non-motorised users, such as cyclists, walkers and horse-riders?

- ☐ Strongly agree
- ☐ Tend to agree
- ☐ Neither agree nor disagree
- ☐ Tend to disagree
- ☐ Strongly disagree
- ☐ Don't know

Please provide comments in support of your answer to question 7:

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8. Do you have any comments on our approach to environmental impact?

For example flooding, air quality, noise etc.

Please see the consultation brochure for more information about the potential environmental impact of the development.

.....

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9. How well do you think the proposal meets Highways England's objectives for the scheme?

i. Reducing delays and queues that occur during peak hours and peak holiday periods throughout the year:

- ☐ Very well
- ☐ Well
- ☐ No opinion
- ☐ Not well
- ☐ Not at all well
- ☐ Not applicable

ii. Improving safety:

- ☐ Very well
- ☐ Well
- ☐ No opinion
- ☐ Not well
- ☐ Not at all well
- ☐ Not applicable

iii. Avoiding unacceptable impacts on the surrounding natural and historic environment and landscape:

- ☐ Very well
- ☐ Well
- ☐ No opinion
- ☐ Not well
- ☐ Not at all well
- ☐ Not applicable

iv. Reducing community severance and promoting opportunities for improving quality of life:

- ☐ Very well
- ☐ Well
- ☐ No opinion
- ☐ Not well
- ☐ Not at all well
- ☐ Not applicable

v. Improving the connectivity of the south west to the rest of the UK:

- ☐ Very well
- ☐ Well
- ☐ No opinion
- ☐ Not well
- ☐ Not at all well
- ☐ Not applicable

vi. Improving journey time reliability and provide extra capacity to make it easier to manage traffic when incidents occur:

- ☐ Very well
- ☐ Well
- ☐ No opinion
- ☐ Not well
- ☐ Not at all well
- ☐ Not applicable

vii. Supporting economic growth in the south west:

- ☐ Very well
- ☐ Well
- ☐ No opinion
- ☐ Not well
- ☐ Not at all well
- ☐ Not applicable

10. Do you have any other comments on our proposals?

About the consultation

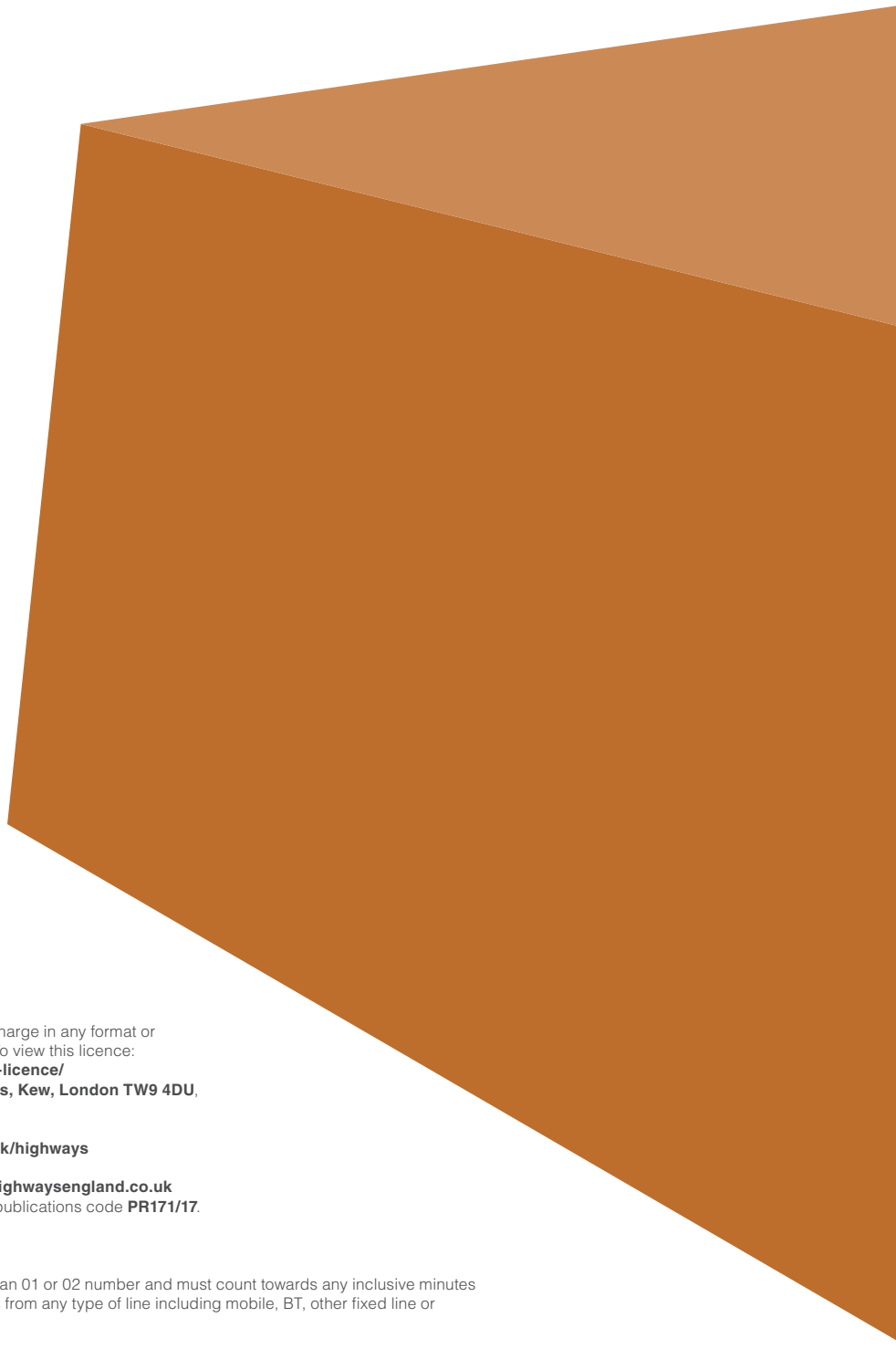
11. How did you find out about the A303 Sparkford to Ilchester Dualling scheme consultation?

- ☐ Letter through the door
- ☐ Highways England website
- ☐ Highways England Twitter
- ☐ Local newspaper advert, article or website
- ☐ Somerset County Council website or email
- ☐ South Somerset District Council website or email
- ☐ Parish council website, email or newsletter (please state which council)
- ☐ Local radio
- ☐ Local community group
- ☐ Other (please specify)

Thank you for completing this questionnaire.

Please return this questionnaire at any of the public consultation events or return it in the prepaid envelope provided or post it to: **FREEPOST Highways Consultation** by **9 March 2018**.

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



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This document is also available on our website at **www.gov.uk/highways**

If you have any enquiries about this publication email **info@highwaysengland.co.uk** or call **0300 123 5000***. Please quote the Highways England publications code **PR171/17**.

Highways England creative job number MCR18_0013

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ADDRESS BLOCK

Tom Roberts
Project Manager
2/07K Temple Quay House
2 The Square
Temple Quay
Bristol BS1 6HA

Enquiries: 0300 123 5000

25 January 2018

Dear <name>

A303 Sparkford to Ilchester dualling scheme
Statutory pre-application consultation until 9 March 2018
Planning Act 2008 Section 42: Duty to consult on a proposed application

I am writing regarding the proposed A303 Sparkford to Ilchester dualling scheme (the "scheme"). The scheme would upgrade the A303 between Sparkford and Ilchester to a high quality dual carriageway.

The route of the scheme starts east of Podimore Roundabout and follows the alignment of the existing A303 to Downhead. Travelling eastwards, the route moves north of the existing A303 single carriageway, allowing the existing road to be retained for use as a parallel local road in this section.

The route then rises up West Camel Hill before crossing over the existing A303 at the junction with Steart Hill and Howell Hill. The route then takes a southerly alignment briefly before meeting up with the existing road again to pass between Vale Farm and the MOD signal station at Eyewell and Traits Lane.

Finally, the route would then bypasses 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.

Highways England is seeking development consent for the scheme under the Planning Act 2008 (the "2008 Act”). This legislation requires Highways England to make an application to the Secretary of State for Transport for a Development Consent Order (DCO) to construct the proposed scheme. Highways England intends to make this application in summer 2018.

Highways England is now commencing formal pre-application consultation about the scheme, in accordance with section 42 of the 2008 Act, until 9 March 2018. Highways England is writing to you because you are a statutory consultee under section 42 of the 2008 Act and Regulation 3 of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009. We are also required to provide you with a copy of the preliminary environmental information ("PEI") in accordance with Regulation 11 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009.

In accordance with the 2008 Act, and the above Regulations, please find enclosed with this letter:

- A hard copy of a section 48 notice, providing formal notification of the application
- A hard copy of the consultation booklet
- A hard copy of the consultation questionnaire
- An electronic copy of the PEI, in the form of a PEI Report, together with a Non-Technical Summary
- A CD with a file containing all of the documents above

The main components of the scheme are set out in the enclosed notice, and within the PEI Report. Please note that, as set out in the enclosed notice, responses to this consultation must be received by Highways England by 23:59 hours on 9 March 2018.

Consultation materials will also be available at a series of public information events, at public information points, and online at **www.highways.gov.uk/Sparkford-to-Ilchester.** Further details of the consultation arrangements can be found at this address, and in the enclosed section 48 notice.

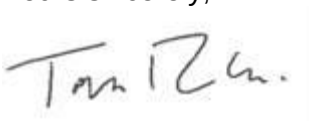
Any responses to this consultation or other representations in respect of the scheme should be sent to the following:

- **By post:** Freepost HIGHWAYS CONSULTATION
- **Online: www.highways.gov.uk/Sparkford-to-Ilchester**
- **By email: A303SparkfordtoIlchesterdualling@highwaysengland.co.uk**

Any response or representation in respect of the proposed application must (i) be received by the applicant on or before 23:59 hours on 9 March 2018, (ii) be made in writing, (iii) state the grounds of the response or representation, (iv) indicate who is making the response or representation, and (v) give an address to which correspondence relating to the response or representation may be sent.

Should you have any queries, please do not hesitate to contact me using the details provided below.

Yours sincerely,



Tom Roberts
Project Manager, A303 Sparkford to Ilchester dualling
Email: A303SparkfordtoIlchesterdualling@highwaysengland.co.uk
Tel: 0300 123 5000

Section 48 - Planning Act 2008

A303 Sparkford to Ilchester Dualling scheme

Notice publicising a proposed application for a Development Consent Order

Regulation 4 Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

Notice is hereby given that **Highways England Company Limited** ("Highways England") of Bridge House, Walnut Tree Close, Guildford, GUI 4LZ proposes to make an application ("the Application") to the Secretary of State for Transport under Section 37 of the Planning Act 2008 for a Development Consent Order.

The Application is for the proposed A303 Sparkford to Ilchester Dualling scheme in Somerset.

The scheme's main proposals in summary are:

- Construction of a new dual carriageway that follows the existing A303 from east of Podimore Roundabout to Downhead. At this point the road moves north before reverting to follow the route of the existing A303 in the direction of Hazlegrove.
- Retention of some existing sections of the A303 as a parallel road to provide local travel connectivity
- Provision of a new junction allowing local traffic access to the new dual carriageway in the vicinity of Downhead
- Provision of a new junction allowing local traffic access to the new dual carriageway in the vicinity of Hazlegrove

The scheme is an Environmental Impact Assessment development ("EIA development"), as defined by The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 and an Environmental Statement will be submitted as part of the Application. A Preliminary Environmental Information ("PEI") Report forms part of the consultation material.

Consultation on the proposals will take place from **Friday 26 January 2018** to **Friday 9 March 2018**. Copies of the consultation materials - including documents, plans and maps showing the nature and location of the proposed development and the PEI Report - will be available for inspection free of charge from **Friday 26 January 2018** to **Friday 9 March 2018** at the following locations and times:

Location	**Opening hours**
Wincanton Library, 7 Carrington Way, Wincanton, Somerset, BA9 9JS	Monday 9.30am to 1.30pm and 2.30pm to 5pm Tuesday 9.30am to 1.30pm and 2.30pm to 5pm Wednesday 9.30am to 1.30pm and 2.30pm to 5pm Thursday Closed Friday 9.30am to 1.30pm and 2.30pm to 5pm Saturday 9.30am to 12pm Sunday Closed
Yeovil Library, King George Street, Yeovil, Somerset, BA20 1PYZ	Monday 9.30am to 12.30pm and 1.30pm to 5pm Tuesday 9.30am to 12.30pm and 1.30pm to 6pm Wednesday 9.30am to 12.30pm and 1.30pm to 5pm Thursday 9.30am to 1pm Friday 9.30am to 12.30pm and 1.30pm to 5pm

	Saturday 9.30am to 12.30pm and 1.30pm to 4pm Sunday Closed
South Petherton Library, St. James Street, South Petherton, Somerset, TA13 5BS	Monday Closed Tuesday 10am to 2pm Wednesday Closed Thursday 10am to 2pm Friday 10am to 1pm and 2pm to 4pm Saturday 9.30am to 1pm Sunday Closed
Taunton Library, Paul Street, Taunton, Somerset, TA1 3XZ	Monday 9.30am to 5.30pm Tuesday 9.30am to 5.30pm Wednesday 9.30am to 7pm Thursday 9.30am to 5.30pm Friday 9.30am to 5.30pm Saturday 9.30am to 5pm Sunday Closed
Somerset County Council, County Hall, Taunton, Somerset, TA1 4DY	Monday 8am to 5pm Tuesday 8am to 5pm Wednesday 8am to 5pm Thursday 8am to 5pm Friday 8am to 4.30pm Saturday Closed Sunday Closed
Martock Library, The Shopping Centre, Martock, Somerset, TA12 6DL	Monday 9.30am to 5pm Tuesday 9.30am to 5pm Wednesday 9.30am to 5pm Thursday Closed Friday 9.30am to 5pm Saturday 9.30am to 12pm Sunday Closed
South Somerset District Council, Brympton Way, Yeovil, Somerset, BA20 2HT	Monday 8.45am to 5.15pm Tuesday 8.45am to 5.15pm Wednesday 8.45am to 5.15pm Thursday 8.45am to 5.15pm Friday 8.45am to 4.45pm Saturday Closed Sunday Closed
Talltrees Community Centre, 4 Taranto Hill, Ilchester, Yeovil BA22 8JP	Monday 8am to 3pm Tuesday 8am to 3pm

	Wednesday 8.45am to 3pm Thursday 8am to 3pm Friday 8am to 3pm Saturday 12.30pm – 11.59pm Sunday 1pm to 10.30pm

Copies of the consultation materials also will be available online free of charge from Friday 26 January 2018 at **www.highways.gov.uk/Sparkford-to-Ilchester**.

Copies of the consultation materials may be requested during the consultation period from Highways England using the e-mail address, postal address or telephone number provided below:

- A303SparkfordtoIlchesterdualling@highwaysengland.co.uk
- A303 Sparkford to Ilchester Dualling, Highways England, 2/07K Temple Quay House, 2 The Square, Temple Quay, Bristol BS1 6HA
- 0300 123 5000 (9am to 5pm, Monday to Friday)

Paper copies of the consultation booklet, response form and Statement of Community Consultation will be supplied free of charge. A CD / DVD of these items together with scheme plans, the Preliminary Environmental Information Report and associated Non-Technical Summary will be supplied free of charge.

Any person may comment on the proposals or otherwise respond to this publicity. Responses must be received between Friday 26 January 2018 and Friday 9 March 2018. A consultation feedback form is available as part of the consultation, and the consultation website will also allow the submission of electronic consultation responses. When providing your response, please include your name and address or, if you would prefer your comments to be anonymous, your postcode only. Please also confirm the nature of your interest in the scheme. Please supply any response to:

- A303SparkfordtoIlchesterdualling@highwaysengland.co.uk
- A303 Sparkford to Ilchester Dualling, Highways England, 2/07K Temple Quay House, 2 The Square, Temple Quay, Bristol BS1 6HA
- 0300 123 5000 (9am to 5pm, Monday to Friday)

Responses must be received no later than Friday 9 March 2018 or, if later, 28 days from the date of this notice.

Highways England will consider and have regard to all responses when developing their Application for a Development Consent Order once consultation has closed. Responses will form the basis of a Consultation Report that will be one of the factors taken into consideration by the Secretary of State when deciding whether the Application can be accepted for examination. Therefore, in providing any comment, it should be borne in mind that the substance of it may be communicated to others as part of the Consultation Report.

If you would like further information about this notice, the consultation or the scheme, please contact the project team by using one of the contact methods provided above.

Tom Roberts, Project Manager, Highways England, 11 January 2018

A303
Sparkford to Ilchester
Dualling Scheme

Preliminary Environmental Information
– Non-Technical Summary

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1 Introduction

A Preliminary Environmental Information report has been prepared as part of the Environmental Impact Assessment for the proposed A303 Sparkford to Ilchester Dualling scheme (the scheme). The aim of the report is to provide information on the Environmental Impact Assessment undertaken to date, that is reasonably required for the consultation bodies to develop an informed view of the likely significant environmental effects of the development. The Preliminary Environmental Information report is required to meet the statutory requirements of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 for the publication and consultation on preliminary environmental information.

This document provides a summary of the Preliminary Environmental Information report and is called the Non-Technical Summary. Further details are contained within the Preliminary Environmental Information report, available at: www.highways.gov.uk/Sparkford-to-Ilchester.

It should be noted that the scheme design is currently being developed and the process of gathering information and identifying how the environment might be affected by the scheme is still underway. The information contained within this document is therefore preliminary only, and the significance of effects remain 'likely' and may change in light of further information and assessment work.

1.1 Scope and content of the Preliminary Environmental Information report

The scheme meets the criteria to be considered as a Nationally Significant Infrastructure Project under the Planning Act 2008 (the Act) and The Highway and Railway (Nationally Significant Infrastructure Project) Order 2013. The scheme is a 'highways' Nationally Significant Infrastructure Project under section 22(5) of the Act (as amended) as it is an alteration of a highway that is wholly within England, where the Secretary of State is the highway authority and the alteration of the highway will be greater than 12.5 hectares.

As the scheme is a Nationally Significant Infrastructure Project, Highways England is required to make an application for a Development Consent Order (DCO) to the Planning Inspectorate. If granted, the DCO will provide the necessary authorisation to allow the scheme to be constructed.

The scheme is classified as an Environmental Impact Assessment development. Therefore, as part of the Environmental Impact Assessment process, a Preliminary Environmental Information report has been prepared to inform the consultation with the public and other stakeholders about the proposed scheme and likely significant environmental effects. An Environmental Statement will then be prepared to accompany the DCO application. The Environmental Statement will report the Environmental Impact Assessment for the scheme, including a description of the likely significant effects of the proposed development on the environment.

The Preliminary Environmental Information report is arranged into different topic chapters, which reflect those which will be used for the Environmental Statement, as follows:

- air quality (see section 2.1)
- cultural heritage (see section 2.2)
- landscape (see section 2.3)
- biodiversity (see section 2.4)
- geology and soils (see section 2.5)
- materials (see section 2.6)
- noise and vibration (see section 2.7)
- people and communities (see section 2.8)
- road drainage and water environment (see section 2.9)
- climate (see section 2.10)
- combined and cumulative effects (see section 2.11)

Each environmental topic chapter within the Preliminary Environmental Information report describes the local environment, and identifies any sensitive receptors such as designated sites, for example Sites of Special Scientific Interest, Conservation Areas or Noise Important Areas. Baseline environmental surveys that have been carried out for each topic are described, along with details of consultation with environmental stakeholders such as local authorities, Historic England, Natural England and the Environment Agency. Any likely impacts of the scheme on the local environment are then described.

1.2 Scheme proposals

The scheme is to provide a continuous dual-carriageway on the A303 linking the Podimore Bypass and the Sparkford Bypass. The scheme will involve the removal of at-grade junctions and direct accesses. Any new junctions include free-flowing merging and diverging slip roads, allowing the A303 to be free flowing and continuous.

The section of the A303 that is to be upgraded is approximately 6 kilometres (3.7 miles) long. The approximate footprint of the scheme is anticipated to be approximately 60 hectares, once open to traffic.

1.3 Description of the scheme

The scheme is located between the town of Sparkford, and the village of Podimore in the South Somerset district of Somerset. It follows the existing corridor of the A303 very closely (see Figure 1-1), although in some places it has been deliberately aligned just to the side of the existing carriageway to allow re-use of the existing route for local access, to avoid property or facilitate construction. At its maximum offset, the route is typically 100 metres either north or south of the existing A303.

At its western limits the route ties in with the existing dual carriageway A303 Podimore Bypass. Travelling eastwards, the route initially follows the existing A303 closely until the B3151 before moving north of the existing carriageway and rising up just to the south of Downhead before crossing over the existing A303 at Conegore Corner. This passes very close to the Noise Important Area at the West Camel Methodist Church (shown on the environmental constraints plan contained within appendix A). The route then takes a southerly alignment briefly before meeting up with the existing road again to pass between a Scheduled Monument and a Ministry of Defence signal station at the crest of Camel Hill. Finally, the route then bypasses the existing Hazlegrove

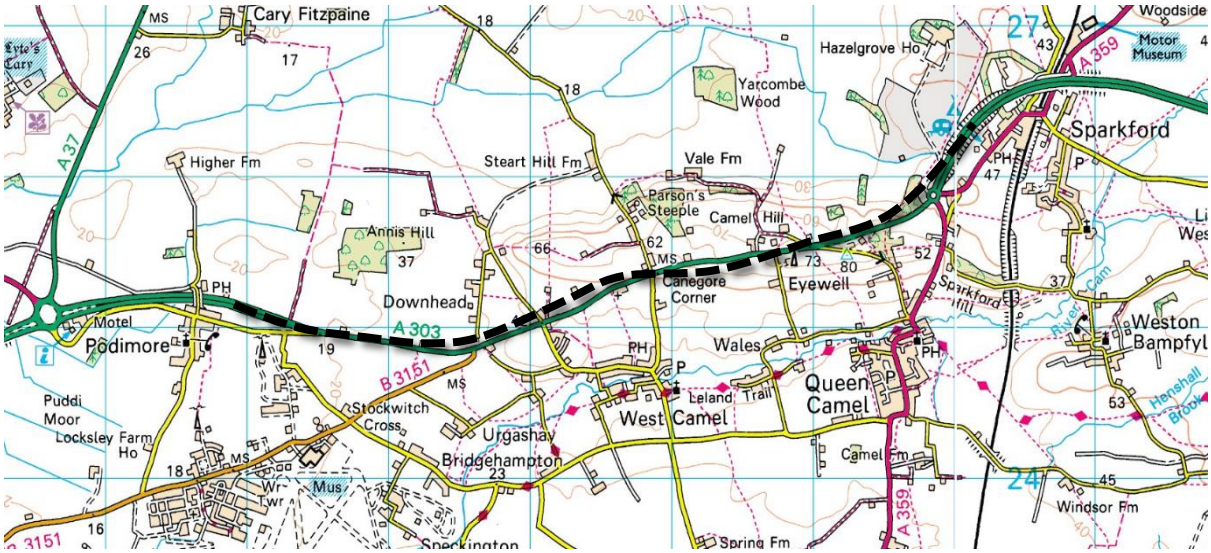
Roundabout to the north through the Registered Park and Garden associated with Hazlegrove House before tieing into the existing A303 north of Sparkford Village.

A new grade-separated junction would be provided within the vicinity of the Hazlegrove roundabout, and an all-movements junction in the vicinity of Downhead Lane. In addition, an overbridge is proposed in the vicinity of Conegore Corner, and the existing westbound slip road to Podimore village will be closed. The junction and local road designs are still evolving. Further details are contained in chapter 2 of the Preliminary Environmental Information report.

As part of the scheme, the construction phase is likely to require temporary traffic management areas, temporary working and storage areas, material stockpiles, construction compounds and haul routes, as well as enabling works including utility diversions and vegetation clearance works. Further construction information is provided within chapter 2 of the Preliminary Environmental Information report. A detailed construction strategy will be developed for inclusion within the Environmental Statement.

The full extents of the application site (the red line boundary) are shown on the environmental constraints plan which is provided in appendix A of this Non-Technical Summary. This includes temporary areas required for the construction of the scheme, such as construction compounds and haul routes.

Figure 1-1**:** Scheme extents



1.4 Objectives of the scheme

The objectives for the scheme are:

- **Capacity –** reduce delays and queues that occur during peak hours and at seasonal times of the year
- **Safety –** improve safety for all users of the A303 between Sparkford and Ilchester, as well as the wider A303 / A358 corridor
- **Support economic growth –** facilitate growth in jobs and housing by providing a free-flowing and reliable connection between the south east and the south west
- **Environment –** avoid unacceptable impacts on the surrounding natural and historic environment and landscape and optimise opportunities for enhancement
- **Local communities –** reduce community severance and promote opportunities for improving their quality of life
- **Connectivity –** improve the connectivity of the south west to the rest of the UK and improve business and growth prospects
- **Resilience –** improve journey time reliability and resilience, and provide extra capacity to make it easier to manage traffic when incidents occur

1.5 Alternatives

Several potential options for the scheme have been considered and consulted on previously prior to the announcement of the preferred route in October 2017. The design of the scheme has evolved through consideration of a number of highway arrangement options against economic, social and environmental data. The preferred route was chosen as it reduces land take and loss of valuable countryside and wildlife, reduces construction in an unspoilt rural setting as the route follows the existing corridor very closely, is preferred by the people that took part in the previous consultation, and will provide better journey time.

Further information on the previous options considered is contained within chapter 3 of the Preliminary Environmental Information report.

1.6 Consultation to date

Highways England has worked closely with local authorities, environmental bodies and other stakeholders such as the local community, landowners, business owners, tenants and people with other land interests located within or around the scheme area, in order to better understand local concerns and consider how to reduce environmental effects through carefully considered design.

A 6 week public consultation was held between 14 February and 29 March 2017. The public consultation presented the 2 shortlisted route options and requested feedback from all interested parties. A total of 1,237 responses were received to the consultation. Highways England analysed all responses before selecting the preferred route, which was announced on the 24 October 2017.

An Environmental Impact Assessment Scoping Report and request for a Scoping Opinion on the scope of the Environmental Impact Assessment to be undertaken for the scheme, was submitted to the Planning Inspectorate on 27 November 2017. The Planning Inspectorate have 42 days to respond to the Environmental Impact Assessment Scoping Report, in the form of the adoption of a Scoping Opinion. The Planning Inspectorate's Scoping Opinion is informed by responses from consultation bodies to the Environmental Impact Assessment Scoping Report.

Prior to receipt of the Scoping Opinion, consultation has been undertaken with South Somerset District Council, Environment Agency, South West Heritage Trust, Historic England, Natural England, National Trust and The Gardens Trust. Further consultation will be undertaken with these bodies with appropriate actions taken following the receipt of the Scoping Opinion.

2 Potential environmental effects

The environmental constraints within the vicinity of the scheme are shown on the drawing contained in appendix A.

2.1 Air quality

The scheme has the potential to cause changes to both local air quality and regional air quality during the construction and operation phases.

The construction of the main works are expected to last approximately 2.5 years, and could affect local air quality through the generation and subsequent deposition of construction dust arising from construction activities and vehicle movements. At this stage, it is not known where the site compound would be located and therefore only the construction boundary associated with the new scheme alignments in relation to sensitive receptors (aspects of the environment that can be affected through changes in the environment as a result of a scheme, e.g. residential properties and Sites of Special Scientific Interest) has been assessed. Well established industry best practice controls would be implemented during the construction as part of the Construction Environmental Management Plan, such as all vehicles to maintain a low speed limit on site to reduce the generation of dust. These measures would reduce the impact of emissions on residents and the local area and prevent nuisance to residents. With these mitigation measures in place, air quality effects from the construction phase are not expected to be significant.

During the operational phase key traffic related pollutants have been predicted at a number of human and ecological receptors within the surrounding area. For human health and wellbeing effects the predicted change in traffic related pollutants would not be significantly adverse, and no additional mitigation measures are required. For the nearby ecological receptors, the assessment identified a potential risk of an adverse effect at the Stockton Wood and Down Site of Special Scientific Interest. Therefore, further assessment will be undertaken to assess the potential changes in nitrogen deposition at this designated site to determine the overall significance of effect of the scheme.

There would be an increase in the number of vehicles travelling along the A303 and this is predicted to cause small changes in regional emissions during operation. Compared to national emissions the increase has been considered as small therefore effects have been assigned as being Not Significant Adverse.

In 2002-03, South Somerset District Council declared an Air Quality Management Area in Yeovil due to monitored and modelled exceedances of the nitrogen dioxide annual mean air quality objective. The Yeovil Air Quality Management Area is located approximately 4.5 miles south of the scheme. Changes in traffic characteristics that may lead to a significant air quality effect are not expected to occur within Yeovil. On this basis, the scheme is not expected to have an effect on the Yeovil Air Quality Management Area in the opening year. Further information is contained within chapter 5 of the Preliminary Environmental Information report.

2.2 Cultural heritage

There are several heritage assets which could potentially be adversely affected by the scheme, either directly through loss or damage during construction or indirectly through adverse effects on the setting and / or amenity value of assets. These heritage assets are shown on the environmental constraints plan contained in appendix A, and include a Scheduled Monument to the north of the existing A303 at Camel Hill Farm, Hazlegrove House (Grade II Listed) Registered Park and Garden, and numerous Grade I, Grade II and Grade II* Listed Buildings. In addition, the archaeological survey and investigation, as well as the archaeological aerial survey and appraisal undertaken, has demonstrated that there is high potential for archaeological remains spanning the prehistoric period to WWII within the study area.

Based on currently known information, the potential for encountering or affecting the different heritage assets is considered to vary substantially between different locations within the study area. During construction, it is currently considered that the overall significance of effects on designated heritage assets would be Moderate / Large Adverse due to the impact upon the setting of these assets. During operation, this would reduce to Slight Adverse once screening planting has matured. The overall significance of effects on buried archaeology during construction would be Moderate Adverse, reducing to Neutral during operation once archaeological investigations and recording are complete.

Further assessment to fully understand the likely effects and to enable to development of detailed mitigation strategies is underway. A detailed heritage desk-based assessment is currently being undertaken which includes targeted cartographic and documentary research, as well as more in-depth analysis of the Historic Environment Record and a detailed analysis of previous disturbance along the route. The assessment will help to highlight additional areas with the potential for buried archaeology, or conversely may demonstrate areas with a reduced potential for buried archaeology due to disturbance from the modern era. The setting of designated assets would be considered in this assessment, and detailed site visits and photography will be undertaken. The assessment of setting would be used to enable appropriate mitigation to be designed and to identify any residual significant effects on the setting of heritage assets from the scheme. A specific Conservation Management Plan will also be developed for the Hazlegrove House (Grade II Listed) Registered Park and Garden, which will inform the design and mitigation in this area as well as identifying appropriate enhancements to the park.

An archaeological geophysical survey was undertaken in December 2017 and January 2018. This may be followed by targeted archaeological evaluation trenching. The surveys would inform mitigation, in the form of final scheme design choices and landscaping, and can help establish pre-construction archaeological investigation strategies. Information relating to these aspects will be included as part of the Environmental Statement, to be submitted as part of the DCO application.

Further information is contained within chapter 6 of the Preliminary Environmental Information report.

2.3 Landscape

There are 2 Conservation Areas (Queen Camel and West Camel) within 1 kilometre of the scheme, and the scheme also lies within National Character Area 140 Yeovil Scarplands. Visual receptors include residential properties, public rights of way, schools, recreational facilities, and several elevated views.

Despite the presence of the existing A303 within the landscape, there is potential for the scheme to lead to a reduction in the quality of local landscape character, particularly during the construction phase when additional machinery and materials would exacerbate the presence of a new feature in the landscape. Large scale construction works, construction traffic, construction machinery and site compounds would all be visible, forming new additions within the landscape and views afforded by local visual receptors.

The eastern end of the route would have a direct effect upon the designated Hazlegrove House (Grade II Listed) Registered Park and Garden, with views likely from elevated positions towards the scheme in the south. Given the sensitivity and proximity of a number of nearby receptors there are likely to be significant adverse effects upon landscape character and visual amenity during construction, whilst other receptors would be affected to a lesser degree. Best practice mitigation measures would be implemented as part of the Construction Environmental Management Plan to ensure adverse effects are reduced as much as possible, such as keeping a well ordered and tidy site, and limiting works to daylight hours in the most part, with any night works to be kept to a minimum.

Once operational, the scheme would be visible from local visual receptors such as residential properties and public rights of way, including those within villages to the south at West Camel and Queen Camel which are designated Conservation Areas. Views would be limited in some areas where the route would be in a cutting below the level of the ground either side of the carriageway, helping to hide the road. Screening planting would also help to conceal the new road, so that by year 15 after opening, it is considered that on balance there would be a Slight Adverse effect for both landscape character and the effects to visual receptors. Additional mitigation such as keeping street lighting columns to a reduced height and using directional lanterns will help to reduce impacts on nearby properties and the wider night sky. Further information is contained within chapter 7 of the Preliminary Environmental Information report.

The Environmental Statement will further address the landscape character and receptors, identifying likely changes in the view for each receptor, the magnitude of change experienced and the resulting significance of effect during construction.

2.4 Biodiversity

Ecological designations within the vicinity of the scheme include 15 Local Wildlife Sites, and a Site of Special Scientific Interest (Sparkford Wood) located 1.3 kilometres (0.8 miles) north east of the scheme. There are 3 Special Areas of Conservation designated for bat populations within 30 kilometres (18.6 miles) of the scheme. These are shown within appendix A. There are valuable habitats and species of nature conservation importance present which could be affected by the scheme. Habitats present include ancient woodland, broad-leaved semi-natural woodland, species-rich hedgerows, and

calcareous grassland. Protected species present on site include bats, great crested newts, reptiles and badgers. Ecological surveys have been undertaken throughout 2017 and are on-going. These surveys and the associated on-going ecological impact assessment will help identify mitigation measures to reduce the magnitude of impacts through the development of a sensitive design and associated ecological and landscape master plan, and construction methodologies, which will safeguard the conservation status of populations through both the construction and operational phases.

A number of measures have been recommended to guide the design process and identify mitigation requirements for both the construction and operation stages of the scheme. However, these measures are not an exhaustive list and are likely to require a review following the completion of the survey and design work, and with the aid of ongoing consultation advice from Natural England. Best practice construction measures implemented through the Construction Environmental Management Plan, such as the sensitive timing of works to avoid breeding seasons, directional and low-level lighting, and the sensitive location of construction machinery with all vehicles switching off engines when stationary, would ensure that adverse effects are reduced as far as practicable. With these measures in place, and at this stage in the development of the scheme and ecological impact assessment, the overall significance of effect for biodiversity features is considered to be Slight Adverse during construction. This is due to the residual disturbance to protected species and the loss of habitats from vegetation clearance. Once operational, mitigation measures including the creation of replacement habitat for great crested newts and reptiles, planting of new hedgerows, trees and scrub and the provision of mammal underpasses where required would result in a Neutral effect.

This conclusion is informed by the surveys undertaken throughout 2017 and predicated on appropriate habitat enhancement and creation being included in the ecological and landscape master plan. The assessment is ongoing, with the full assessment results to be presented within the Environmental Statement. Further information is contained within Chapter 8 of the Preliminary Environmental Information report.

2.5 Geology and soils

There are 2 Local Geological Sites located within 1 kilometre (0.6 miles) of the scheme (see appendix A). The completed scheme would not result in direct effects upon geology and soils once open to traffic, and it is subsequently considered that there are no significant adverse effects on geology or soils for the operational scheme. However, there is the potential for adverse effects on geology and soils related receptors from the proposed scheme during construction, including encountering contaminated materials within landfills / made ground during construction, mobilisation of contaminants and generation of contaminant transport pathways from site activities. Appropriate mitigation measures to limit or potentially completely remove these effects will be included as part of the Construction Environmental Management Plan to ensure adverse effects are reduced as far as possible. This mitigation is outlined in chapter 9 of the Preliminary Environmental Information report and includes measures designed to:

- protect soil structure and quality
- minimise waste generation
- protect controlled waters from both general site works and foundation works
- manage construction machinery and materials

- manage excavations and dewatering

The final mitigation measures set out in the Environmental Statement will be sufficient so that all identified effects to receptors are reduced as much as is reasonably practicable, within the constraints of the proposed scheme and in accordance with all applicable legislation.

2.6 Materials

There are a number of British Geological Survey Mineral Sites in close proximity to the current A303, as well as a Mineral Safeguarding Site, and several landfills. There is potential for significant effects due to material usage and waste arisings during construction of the scheme. Through reusing soil materials onsite wherever possible, there would be a reduction in materials required and wastes produced. In addition, materials to be used onsite would, where practicable, contain high proportions of recycled content. However, the proposed scheme would generate waste during construction which would need to be appropriately managed. To do this, a Site Waste Management Plan will be prepared for construction, which will consider the sourcing, transport, and use and disposal of waste materials in a sustainable manner. A Materials Management Plan will also be produced for the earthworks. This would ensure that excavated and imported materials comply with an earthworks specification which will ensure that the geotechnical and chemical composition is acceptable before being used on-site during construction.

The current assessment concludes that the quantity of material resources required to construct the scheme would be significant. Further assessment for material resources will be undertaken and presented within the Environmental Statement, based on further construction information and the final design. Due to the nature of the scheme, effects associated with materials and waste during operation are anticipated to be Neutral, as it is anticipated that there would be minimal requirement for material resources and minimal waste generation, besides infrequent maintenance activities.

2.7 Noise and vibration

There are 2 Noise Important Areas located within the footprint of the scheme on the existing A303 just to the east of Camel Cross and approximately 1.5 kilometres (0.9 miles) to the west of Howell Lane. The assessment of noise and vibration effects completed to date shows that the construction and operation of the scheme has the potential to give rise to both temporary and permanent noise and vibration at the sensitive receptors in the area. With best practice mitigation measures in place during construction which will be designed to reduce and screen noise from construction machinery and vehicles, this effect is considered to be on-balance Not Significant Adverse. Mitigation measures may include the selection of the most appropriate construction method and construction machinery / vehicles for the job, adequate maintenance of construction equipment, the position of stationary construction machinery with respect to sensitive noise receptors, local noise screening and the education of the workforce. Restrictions may also be placed on early / late delivery times.

Mitigation in the form of noise fences or noise bunds where required are being incorporated as part of the ongoing scheme design development. These measures,

along with low noise road surfacing will help to reduce the level of noise from road traffic once the road is open. An overall Not Significant Adverse effect is therefore predicted during operation.

Further information is contained within chapter 11 of the Preliminary Environmental Information report.

2.8 People and communities

Potential effects associated with the proposed scheme upon people and communities including non-motorised users, amenity, severance, agricultural land, demolition of private property and associated land take, motorised travellers' views from the road and driver stress have been provisionally assessed. At this stage it is expected that there would be an overall Slight Adverse effect on people and communities during construction, due to the disturbance caused from the presence of construction machinery, temporary traffic management and associated delays. Construction stage effects for road users, pedestrian, cyclists and equestrians would be managed through the implementation of a Construction Environmental Management Plan and Community Relations Strategy, as well as the implementation of a Traffic Management Plan. These would ensure that construction is undertaken in a sensitive and considerate manner, with regards to people within the local community.

Once the scheme is operational, it is anticipated that there would be some benefits for non-motorised users through the provision of new facilities and safer access, although there may be some increase to journey times. Early consultation with Rights of Way Officers has been held, which has aided the further development of mitigation and enhancement opportunities for non- motorised users. This consultation is ongoing, and will further inform the design as it progresses.

Further detailed assessment for impacts upon private property and land will be carried out for the Environmental Statement. This will inform the final assessment of likely significance for people and communities. Additional information regarding the assessment undertaken to date is contained within chapter 12 of the Preliminary Environmental Information report.

2.9 Road drainage and the water environment

There are 2 Water Framework Directive (WFD) waterbodies in the vicinity of the scheme. These are 'The Cary – source to confluence with King Sedgemoor Drain' which runs to the north of the scheme, and 'The Cam – Lower', located approximately 650 metres of the south of the scheme. There are areas of Flood Zones 3 and 2 to the north and south of the scheme, mainly associated with the Dyke Brook and River Cam. No likely significant effects on the water environment have been identified once the scheme is open to traffic. This is because the scheme is not located within a flood zone, and because sustainable drainage systems and pollution control measures will be incorporated within the drainage design. Sustainable drainage systems will manage and reduce the likelihood of flooding outside of the scheme and provide protection to surrounding watercourses from road run-off. However, a Flood Risk Assessment will be prepared to support the DCO application, which will be used to demonstrate that there is no increased flood risk as a result of the road being built, and to help further develop appropriate mitigation and the drainage design to ensure that is the case.

Best practice construction measures will also be included in the Construction Environmental Management Plan to ensure that there is no risk of pollution during the construction stage. Mitigation measures will include the storage of liquids, soils and powders appropriately away from drains and waters, and in secondary containment, in accordance with guidance provided by the Construction Industry Research and Information Association.

Further information is contained within chapter 13 of the Preliminary Environmental Information report.

2.10 Climate

The effects of the scheme upon climate have been provisionally assessed, taking into account the greenhouse gases emitted through the materials used to construct the scheme, the greenhouse gases and carbon dioxide emitted during the life-time of the scheme, and the vulnerability of the scheme to climate change.

At this stage, it is anticipated that due to the quantity of materials required for the scheme, further assessment of the construction stage would be required using the Highways England Carbon Tool in conjunction with the Carbon Reduction Hierarchy to analyse the effect that the scheme has on the climate from construction stage emissions. This will be presented within the Environmental Statement. During operation, effects on climate are likely to result due to vehicle emissions from traffic using the road. This will be explored further as part of the assessment contained within the Environmental Statement.

In terms of the scheme's vulnerability to climate, during construction, Neutral effects are anticipated since it is not expected that substantial changes to climate will occur over the 2.5 year construction period. Mitigation measures within the Construction Environmental Management Plan, such as ensuring construction materials are covered when stored, and pro-active planning for extreme weather events, will reduce any adverse effects during construction. During scheme operation, there is the potential for scheme assets and environmental receptors to be affected by changes in climate such as from increased number of extreme weather events, hotter summers and wetter winters. This may result in changes to the maintenance of assets such as signs and signals, drainage systems and landscape planting. Whilst it is not currently considered that these effects are likely to be significant, the impact of this will be looked at in more detail for the Environmental Statement. Further information is contained within chapter 14 of the Preliminary Environmental Information report.

2.11 Combined and cumulative effects

Combined effects result when several individual effects from a scheme have a combined effect on a receptor. Cumulative effects result when several developments together have a cumulative effect on a receptor.

The combined assessment has brought together the provisional findings of each of the topic chapters in order to identify and assess the combined effects of the scheme, and has been presented within the Preliminary Environmental Information report. At present, the residual combined effect during construction and operation is anticipated to be Not Significant Adverse, with the implementation of the mitigation measures included in the individual discipline chapters.

The cumulative effects of the scheme in association with other existing or future major developments in the study area has also been assessed. The list of developments includes 1 mixed use development site in Sparkford (Former Haynes Publishing Site, planning application reference 16/00725/OUT), and 1 residential development in Ilchester (Land North of Troubridge Park, planning application reference 15/00024/OUT). Currently, the residual cumulative effects during construction as a result of all of the 'other developments' being implemented at the same time as the scheme would be anticipated to be Not Significant Adverse, as none of the other developments assessed have reported significant adverse effects. During operation, residual cumulative effects for the scheme would be anticipated to be Not Significant Adverse, as none of the other developments assessed have reported significant adverse effects.

Further detailed assessment of the combined and cumulative effects will be required as the scheme develops, to be presented as part of the Environmental Statement. The list of proposed developments to be included within the cumulative effects assessment will be reviewed and developed with South Somerset District Council's Planning Team to ensure that all necessary developments are captured as part of the assessment, and to ensure that construction start dates and lengths are fully understood. Further information is contained within chapter 15 of the Preliminary Environmental Information report.

3 Public Consultation

3.1 Public Consultation

Highways England wishes to obtain the views of the public on the proposed scheme during the consultation period, 26 January to 9 March 2018. These views will be taken into account in finalising the design, refining the Environmental Impact Assessment and preparing the Environmental Statement. Responses can relate to the environmental information set out in the Preliminary Environmental Information report or to any other aspect of the proposed scheme.

The following methods can be used to contact Highways England and / or respond to the consultation:

- Attend a public consultation exhibition to meet the project team and complete a consultation questionnaire
- Complete the consultation questionnaire online at: www.highways.gov.uk/Sparkford-to-Ilchester
- Collect a consultation questionnaire at 1 of the public viewing places (see list below) and return by post or by e-mail:
  - Address: A303 Sparkford to Ilchester Project Team, Highways England, 2/07k Temple Quay House,2 The Square, Temple Quay, Bristol, BS1 6HA
  - Email: mailto:A303SparkfordtoIlchesterDualling@highwaysengland.co.uk
- Call Highways England on 0300 123 5000 (9am to 5pm, Monday to Friday).

Consultation material explaining the proposal will also be available to view from 26 January to 9 March at the following community locations:

- **Wincanton Library**, 7 Carrington Way, Wincanton, Somerset, BA9 9JS
- **Yeovil Library**, King George Street, Yeovil, Somerset, BA20 1PYZ
- **South Petherton Library**, St. James Street, South Petherton, Somerset, TA13 5BS
- **Taunton Library**, Paul Street, Taunton, Somerset, TA1 3XZ
- **Somerset County Council**, County Hall, Taunton, Somerset, TA1 4DY
- **Martock Library**, The Shopping Centre, Martock, Somerset, TA12 6DL
- **South Somerset District Council**, Brympton Way, Yeovil, Somerset, BA20 2HT
- **Talltrees Community Centre**, 4 Taranto Hill, Ilchester, Yeovil, BA22 8JP

3.2 After the public consultation

Following the consultation period, a Consultation Report will be produced to summarise the views and comments received, and outline how they have been taken into consideration in refining the scheme. Highways England will include this report as part of the DCO application which is planned for submission in the summer of 2018. The Planning Inspectorate will decide whether the application meets the required standards to proceed to examination.

Appendix A – Environmental constraints plan

RIVER CARY - SOURCE TO CONFLUENCE WITH KING SEDGEMOOR DRAIN (KSD)
DYKE BROOK
CELTIC WAY
STEART HILL
MEAD LANE (TRACK)
STEART HILL
CELTIC WAY
A303
SPARKFORD
HIGH STREET
RIVER CAM - UPPER
DOWNHEAD LANE (TRACK)
CAMEL HILL
EASTMEAD LANE (TRACK)
DOWNHEAD
WEST CAMEL HILL
A303
GASON LANE
A359
TRAITS LANE
SPARKFORD HILL
CELTIC WAY
HOWELL HILL
A303
PODIMORE
B3151
RIVER CAM - LOWER
LELAND TRAIL
WEST CAMEL
QUEEN CAMEL
LELAND TRAIL
PARSONAGE ROAD
LELAND TRAIL
ROYAL NAVAL AIR STATION, YEOVILTON

Target Notes:

1. ST PETERS CHURCH
2. THE PODYMORE INN PUBLIC HOUSE
3. MEDIEVAL SETTLEMENT REMAINS 100M AND 250M NORTH OF DOWNHEAD MANOR FARM SCHEDULED MONUMENT
4. MILESTONE ON A303 AT NGR ST57892538 (GRADE II) LISTED BUILDING
5. WEST CAMEL METHODIST CHURCH
6. WEST CAMEL CONSERVATION AREA
7. ROMANO-BRITISH SETTLEMENT IMMEDIATELY SOUTH WEST OF CAMEL HILL FARM SCHEDULED MONUMENT
8. CAMEL HILL TRANSMITTER SITE LWS
9. GASON LANE FIELD LWS
10. CAMEL HILL QUARRY EAST LGS
11. RIDGE COPSE LWS
12. CAMEL HILL QUARRY HISTORIC LANDFILL
13. SPARKFORD HILL COPSE LWS AND LGS
14. QUEEN CAMEL CONSERVATION AREA
15. HAZLEGROVE HOUSE (GRADE II LISTED) REGISTERED PARK AND GARDEN
16. HAZLEGROVE PARK LWS
17. LAND ADJACENT TO HAZLEGROVE PARK HISTORIC LANDFILL
18. SPARKFORD INN PUBLIC HOUSE
19. SPARKFORD CRICKET CLUB
20. SPARKFORD WOOD SSSI

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Client: highways england

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Key to Symbols:

- DRAFT RED LINE BOUNDARY
- NAMED WALKING ROUTES
- FOOTPATH ALONGSIDE CARRIAGEWAY
- FOOTPATH
- BRIDLEWAY
- RESTRICTED BYWAY
- CYCLE ROUTE
- FOSSE WAY
- REGISTERED PARK ND GARDEN
- HISTORIC LANDFILL
- PONDS, LAKES AND RUNNING WATER
- LISTED BUILDING
- ANCIENT WOODLAND
- NOISE IMPORTANT AREA
- SITES OF SPECIAL SCIENTIFIC INTEREST (SSSI)
- CONSERVATION AREA
- SCHEDULED MONUMENT
- LOCAL GEOLOGICAL SITE (LGS)
- FLOOD ZONE 2
- FLOOD ZONE 3
- LOCAL WILDLIFE SITE (LWS) (SOMERSET ENVIRONMENTAL RECORDS CENTRE, JUNE 2017)
- NATIONAL TRUST LAND
- CANDIDATE LOCAL WILDLIFE SITE (SOMERSET ENVIRONMENTAL RECORDS CENTRE, JUNE 2017)
- REGISTERED COMMON LAND
- ANCIENT WOODLAND IDENTIFIED BY SOMERSET ENVIRONMENTAL RECORDS CENTRE
- PROPOSED DEVELOPMENTS IDENTIFIED IN THE SOMERSET DISTRICT COUNCIL HOUSING AND ECONOMIC LAND AVAILABILITY ASSESSMENT

Project Title:
A303 SPARKFORD TO ILCHESTER DUALLING

Drawing Title:
ENVIRONMENTAL CONSTRAINTS PLAN

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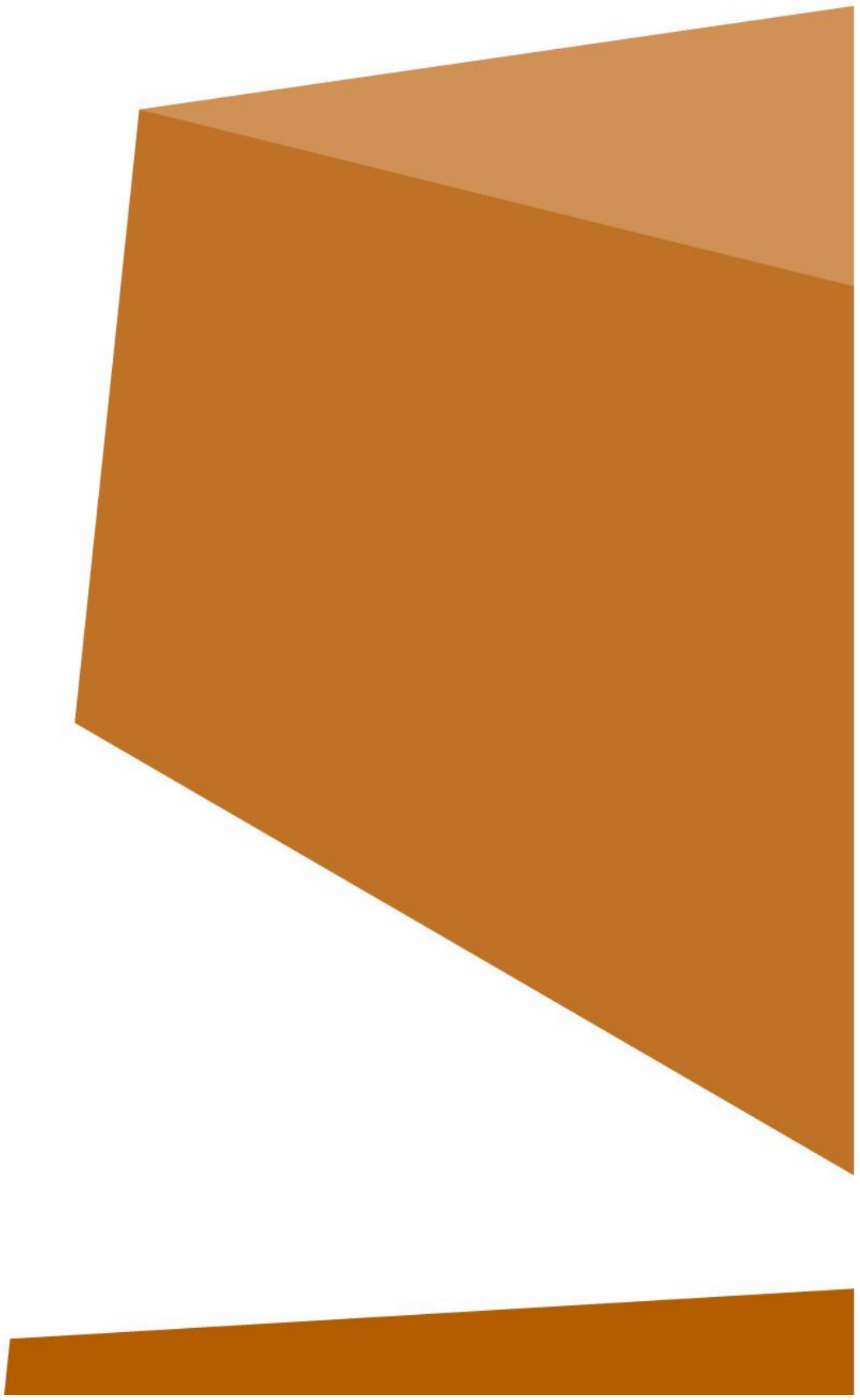

A303
Sparkford to Ilchester
Dualling Scheme

Preliminary Environmental Information

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Executive summary

This Preliminary Environmental Information (PEI) report has been prepared for the A303 Sparkford to Ilchester Dualling scheme (hereafter referred to as 'the scheme') as part of the statutory consultation.

The information contained within this report is 'preliminary' and has been produced to enable consultees to understand the likely environmental effects of the scheme and to help inform their consultation response on the scheme during the pre-application stage of the Development Consent Order (DCO). As such, the likely significance of the effects reported may change on the basis of information obtained after this point. The production of a PEI report is a requirement of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.

Chapters 1 to 4 of this PEI report provide an overview of the scheme, summarise the alternative options considered, summarise the Environmental Impact Assessment (EIA) process, and provide an overview of the consultation to date. Chapters 5 to 15 of this PEI report include assessments for the following environmental disciplines:

- air quality
- cultural heritage
- landscape
- biodiversity
- geology and soils
- materials
- noise and vibration
- people and communities
- road drainage and the water environment
- climate
- combined and cumulative effects

Each environmental discipline chapter provides information on the likely environmental effects associated with the scheme, based on information available to date and with mitigation measures in place where these have been identified. Further mitigation measures may be identified for each discipline, following consultation and will be reported within the Environmental Statement (ES).

This PEI report is supported by a series of supporting drawings contained within the appendices.

A non-technical summary of the PEI report has also been produced to support the statutory public consultation, and is available at: www.highways.gov.uk/Sparkford-to-Ilchester.

The following methods can be used to contact Highways England and / or respond to the consultation:

- Attend a public consultation exhibition to meet the project team and complete a consultation questionnaire
- Complete the consultation questionnaire online at: www.highways.gov.uk/Sparkford-to-Ilchester
- Collect a consultation questionnaire at 1 of the public viewing places (see list below) and return by letter or by e-mail:
  - Address: A303 Sparkford to Ilchester Project Team, Highways England, 2/07k Temple Quay House,2 The Square, Temple Quay, Bristol, BS1 6HA
  - Email: mailto:A303SparkfordtoIlchesterDualling@highwaysengland.co.uk
- Call Highways England on 0300 123 5000 (9am to 5pm, Monday to Friday).

1 Introduction

1.1 The role of Preliminary Environmental Information

1.1.1 Preliminary Environmental Information (PEI) is defined in Regulation 12(2)(b) of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 as:

1.1.2 'information referred to in regulation 14(2) which –

(a) has been compiled by the applicant; and
(b) is reasonably required for the consultation bodies to develop an informed view of the likely significant environmental effects of the development (and any associated developments)' to assess the environmental effects of the development (and of any associated development)'.

1.1.3 This PEI report has been prepared for the A303 Sparkford to Ilchester Dualling scheme (hereafter referred to as 'the scheme'). The information contained within this report is preliminary. This report has been produced to enable consultees (both specialist and non-specialist) to understand the likely environmental effects of the scheme and to help inform their consultation response on the scheme during the pre-application stage.

1.1.4 Feedback received from this consultation will then be taken into consideration within both the design of the scheme and the preparation of the Environmental Statement (ES).

Overview of the scheme

Existing route corridor

1.1.5 The A303 / A30 forms part of Highways England's Strategic Road Network (SRN) and a strategic link between the south west and the rest of the south, south-east and London. The route comprises multiple road standards, including dual-carriageway, single-carriageway and single-carriageway sections with overtaking lanes. Speed limits also vary between 40mph and 70mph, depending on the character of the road and its surroundings.

Existing scheme road

1.1.6 The section of the A303 that is being upgraded as part of this scheme commences at the eastern limits of the existing dual-carriageway Podimore Bypass. Travelling east, the route reaches the junction with the B3151 before bearing north-east and rising upwards through Conegore Corner to reach the crest of Camel Hill at Eyewell. This section of the route is characterised by a single carriageway 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

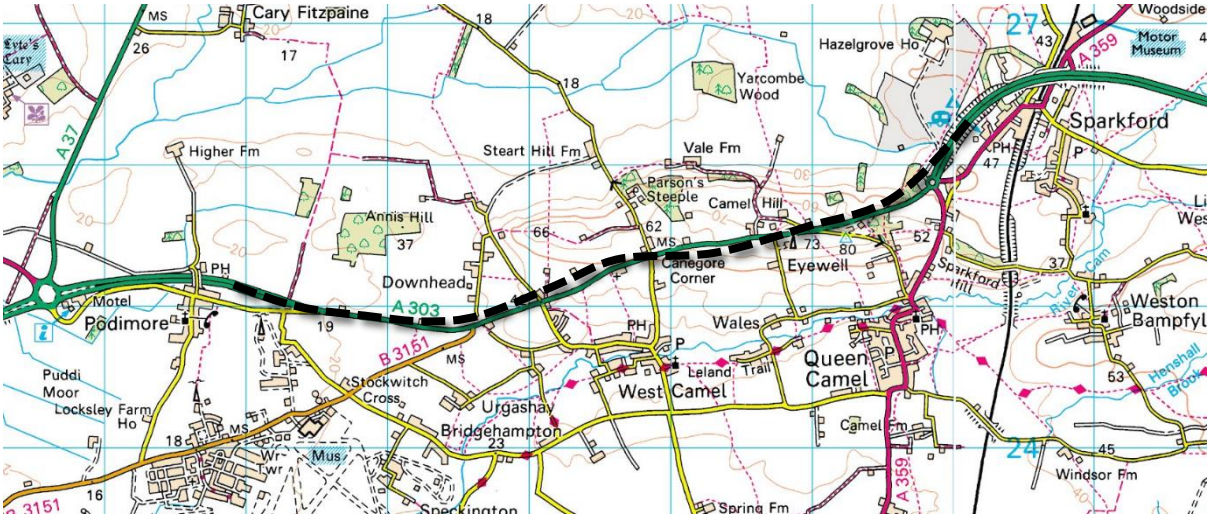
south and Downhead to the north, as well as several farm accesses and parking laybys.

1.1.7 From the crest of Camel Hill, the route descends to meet the roundabout at the western limit of the dual-carriageway Sparkford Bypass (Hazlegrove Roundabout). This section comprises 2 lanes in the westbound direction, 1 lane in the eastbound direction and is also subject to a 50mph speed limit. Hazlegrove Roundabout forms a junction between the A303 and the A359 which runs south through Queen Camel and north-east through Sparkford. The roundabout also provides access to a service station, and to a school at Hazlegrove House.

1.1.8 The section of the A303 that is to be upgraded is approximately 6 kilometres long.

1.1.9 The extents of the scheme are indicated by the draft red line boundary shown on the plans contained within both appendix A.1 and appendix A.2. Figure 1.1 illustrates the location of the proposed route.

Figure 1.1: Scheme location



Scheme proposals

1.1.10 The proposed scheme is to provide a continuous dual-carriageway on the A303 linking the Podimore Bypass and the Sparkford Bypass. The scheme will involve the removal of at-grade junctions and direct accesses. Any new junctions will be constructed to grade-separated standards, or to compact grade-separated standards depending upon anticipated traffic flows.

1.1.11 A detailed description of the scheme is provided within section 2.5, and a plan containing the proposed draft red line boundary is contained within appendix A.2.

1.2 Legislative context and the need for environmental impact assessment

1.2.1 The proposed scheme is classed as a Nationally Significant Infrastructure Project (NSIP) under the Planning Act 2008 Section 22 as amended by The Highway and Railway (Nationally Significant Infrastructure Project) Order 2013, by virtue of the fact that it meets the following criteria, taken from Section 3 of the Order:

- The proposed scheme would involve the alteration of a highway that is wholly within England for which the Secretary of State is the highway authority
- The speed limit for the highway is expected to be 50 miles per hour or greater, and the area of development will be 12.5 hectares or more.

1.2.2 The scheme falls within Schedule II of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (EIA Regulations). By virtue of the fact that the potential for significant adverse environmental effects has been identified, an ES is being prepared to accompany the Development Consent Order (DCO) application to the Planning Inspectorate that is being progressed for the scheme. The Regulation 8(1)(b) notice was submitted to the Planning Inspectorate on the 29 November 2017, notifying the Planning Inspectorate of the intention to provide an ES with respect to the scheme.

1.2.3 The ES will be carried out in accordance with the requirements of the Infrastructure Planning (EIA) Regulations 2017, which are the relevant EIA regulations for NSIPs.

Planning policy context

National Policy Statement for National Networks

1.2.4 The National Policy Statement for National Networks (NPSNN)[1] sets out the need for, and Government's policies to deliver development of NSIPs on the national road network in England. It sets out the primary basis for making decisions of development consent for NSIPs in England. The Government recognises in the Appraisal of Sustainability accompanying the NPSNN that some developments will have some adverse local impacts on noise, emissions, landscape / visual amenity, biodiversity, cultural heritage and water resources. The significance of these effects and the effectiveness of mitigation is uncertain at the strategic and non-locational specific level of the NPSNN. Therefore, whilst applicants should deliver developments in accordance with Government policy and in an environmentally sensitive way, including considering opportunities to deliver environmental benefits, some adverse local effects of development may remain.

[1] 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 August 2017).

1.2.5 Evidence demonstrating compliance of the scheme with the NPSNN will be provided within the National Policy Statement for National Networks Accordance Table which will be submitted as part of the DCO application. Any environmental assessment principles outlined in the National Networks National Policy Statement Accordance Table will be taken into account within the ES.

National Planning Policy Framework

1.2.6 The National Planning Policy Framework (NPPF)[2] sets out the Government's planning policies for England and the requirements for the planning system. It provides a framework within which local authorities and residents can produce local and neighbourhood plans reflecting the needs and priorities of communities.

1.2.7 The NPPF does not contain specific policies for NSIPs for which particular considerations apply. NSIPs are determined in accordance with the decision-making framework set out in the Planning Act 2008 and relevant National Policy Statements for major infrastructure. For highways schemes, the relevant National Policy Statement is the NPSNN, details of which are outlined above. The Planning Statement, to be prepared to support the DCO application, will set out any material considerations given to the NPPF.

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

2 Scheme description

2.1 Road Investment Strategy

2.1.1 In December 2014, the Department for Transport (DfT) published the Road Investment Strategy (RIS) for 2015-2020[3]. The RIS sets out the list of schemes that are to be developed by Highways England over the period covered by the RIS.

2.1.2 Highways England, as the strategic highways company and appointed by the Secretary of State must, in exercising its functions and complying with its legal duties and other obligations, act in a manner which it considers best calculated to, among others:

- Minimise the environmental impacts of operating, maintaining and improving its network and seek to protect and enhance the quality of the surrounding environment
- Conform to the principles of sustainable development

2.2 Need for the scheme

2.2.1 Dualling of the A303 between Sparkford and Ilchester was announced in the RIS for the 2015/16 to 2019/20 road period[4].

2.2.2 The single carriageway section of the A303 between Sparkford and Ilchester suffers from congestion and queuing, particularly during the summer months and at weekends. It also suffers from higher than national average accident rates for single-carriageway A-class trunk roads. Numerous at-grade junctions and accesses, non-motorised user (NMU) crossing points and limited space for road workers during maintenance create hazards for numerous user groups.

2.2.3 Dualling of the A303 between Sparkford and Ilchester is an appropriate solution which would meet the objectives of the DfT (see section 2.3 scheme objectives) and overcome the existing traffic problems on this section of road.

2.2.4 An assessment of alternative modal solutions would be contained within the National Policy Statement for National Networks Accordance Table to be submitted as part of the Development Consent Order (DCO) application.

[3] Department for Transport (2015) Road Investment Strategy: for the 2015/16 – 2019/20 Road Period [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/408514/ris-for-2015-16-road-period-web-version.pdf (last accessed October 2017).
[4] Department for Transport (2015) Road Investment Strategy: for the 2015/16 – 2019/20 Road Period.

2.3 Scheme objectives

Department for Transport objectives

2.3.1 The DfT has an aspiration for the Strategic Road Network (SRN) to be smoother, smarter and sustainable by 2040 (see Part 1, Chapter 2 of the RIS[5]). The DfT aims to achieve this by focussing on 8 key performance areas as set out in Part 3, Chapter 1 of the RIS. These are:

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

2.3.2 Further information is available in the RIS.

Highways England objectives

2.3.3 The objectives of the scheme are:

- **Capacity** – reduce delays and queues that occur during peak hours at seasonal times of the year
- **Safety** – improve safety for all users of the A303 between Sparkford and Ilchester, as well as the wider A303 / A358 corridor
- **Support economic growth** – facilitate growth in jobs and housing by providing a free-flowing and reliable connection between the south east and the south west
- **Environment** – avoid unacceptable impacts on the surrounding natural and historic environment and landscape and optimise opportunities for enhancement
- **Local communities** – reduce community severance and promote opportunities for improving their quality of life
- **Connectivity** – improve the connectivity of the south west to the rest of the UK and improve business and growth prospects
- **Resilience** – improve journey time reliability and resilience, and provide extra capacity to make it easier to manage traffic when incidents occur

[5] DfT (2015) Road Investment Strategy: 2015 to 2020 [online] available at: https://www.gov.uk/government/collections/road-investment-strategy (last accessed November 2017).

2.4 Scheme location

2.4.1 The 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 between Hazlegrove roundabout and Podimore roundabout. The location of the scheme can be seen in the environmental constraints plan contained in appendix A.1. The scheme extent of the application site is also shown on the plan contained in appendix A.1, and is depicted by the red line (the red line boundary).

2.4.2 The landscape surrounding this section of the A303 between Sparkford and Ilchester is largely rural with field patterns and intermittent individual properties. Settlements in a rural environment lie to the south at West Camel and Queen Camel. The existing A303 runs along the top of the partially wooded ridge of Camel Hill, before descending to Sparkford. The land to the west of Sparkford is a level area drained by a series of ditches leading to the Dyke Brooke and westward to the River Cary, whilst the field pattern in this area comprises large geometric, narrow lands and thick hedgerows. Blocks of woodland occasionally punctuate the field pattern and are partially prominent on the western section from Camel Hill to Sparkford. At Podimore, the topography comprises flat low-lying level agricultural land, with the rising ground of Annis Hill to the east of Podimore forming a minor feature which is capped, before rising towards Camel Hill which is characterised by its sloping sides and blocks of woodland.

2.4.3 The following statutory environmental designations are located within the vicinity of the scheme:

- There are 2 scheduled monuments (Romano-British settlement immediately south-west of Camel Hill Farm and Medieval settlement remains 100 metres and 250 metres north of Downhead Manor Farm) within 1 kilometre of the scheme.
- There is 1 Site of Special Scientific Interest (SSSI) (Sparkford Wood) 1.3 kilometres north-east.
- There are 2 Conservation Areas (Queen Camel and West Camel) within 1 kilometre of the scheme.
- There are numerous Grade I, Grade II and Grade II* Listed Buildings within 1 kilometre.
- There are 3 Special Areas of Conservation (SACs) (Mells Valley SAC, North Somerset and Mendip Bats SAC, and Bracket's Coppice SAC) designated for bat populations within 30 kilometres of the scheme.
- The eastern end of the scheme would pass through the southern third of Hazlegrove House (Grade II Listed) Registered Park and Garden.
- There are 4 designated ecological sites within 200 metres of the Affected Road Network (ARN), including Stockton Wood and Down SSSI.

2.4.4 The following non-statutory environmental designations are located within the vicinity of the scheme:

- There are 15 Local Wildlife Sites (LWSs) within 2 kilometres of the scheme.
- There are 2 Local Geological Sites (LGSs) within 1 kilometre of the scheme.
- All of the environmental designations located within 2 kilometres of the scheme extents, or just outside, are shown on the plan contained within appendix A.1. In terms of material assets, there are a number of British Geological Survey (BGS) Mineral Sites in close proximity to the current A303, as well as a Mineral Safeguarding Site, and several landfill sites.

2.5 Scheme description

Introduction

2.5.1 The preferred route for the scheme was confirmed by Highways England in October 2017.

2.5.2 The scheme follows the existing corridor of the A303 very closely. It is generally considered to be an online solution 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 off-set, the route is typically 100 metres either north or south of the existing A303.

2.5.3 The section of the scheme that is to be upgraded is approximately 6 kilometres long. The footprint of the scheme is anticipated to be approximately 60 hectares. However, the ES will provide more details on scheme parameters, along with any limits of deviation, and the description will reflect the description of the scheme within the draft DCO submission. The ES will be supported by appropriate figures and design drawings.

Description (mainline)

2.5.4 At its western limits, the scheme ties in with the existing dual-carriageway A303 Podimore Bypass. Travelling eastwards, the route initially follows the existing A303 closely until the B3151 before moving north of the existing carriageway and rising up to the south of Downhead, before crossing over the existing A303 at Conegore Corner. This would pass very close to the Noise Important Area (NIA) at the West Camel Methodist Church (see appendix A.1 for the location of this NIA). The route then takes a southerly alignment briefly before meeting up with the existing road again to pass between a Scheduled Monument and a Ministry of Defence (MOD) signal station at the crest of Camel Hill. Finally, the route then bypasses the existing Hazlegrove Roundabout to the north through Hazlegrove House (Grade II Listed) Registered Park and Garden in a false cutting, before tying into the existing A303 north of Sparkford Village.

Description (junctions)

2.5.5 A new all movements grade-separated junction would be provided in the vicinity of the Hazlegrove Roundabout. This will enable free flowing passage of traffic on the A303. The junction will incorporate entry and exit slip roads in both

directions providing connections to Hazlegrove House, the A359, access to villages south of the route and access to properties at Camel Hill to the north of the scheme. The junction design is currently evolving as part of on-going discussions with environmental stakeholders.

2.5.6 A limited movements junction, comprising eastbound slips only, will be provided in the vicinity of Downhead. A limited movement junction will be provided in the vicinity of the junction with the B3151 comprising westbound exit and entry slip roads.

Description (side roads)

2.5.7 A connection would be provided between local roads to the north and south of the route in the vicinity of Conegore Corner via an overbridge, incorporating a link to the A303 eastbound via the junction at Downhead. At the western end of the scheme the existing westbound slip road to Podimore village will be closed. Access to Podimore village will therefore be via the A303 / A37 junction (Podimore Roundabout).

Additional features

2.5.8 In addition to the above principal elements, additional features associated with the scheme will include drainage, landscaping, environmental mitigation, lighting, signage, and utility diversions. Precise information on these elements is unknown at this stage. Details of these additional features will be provided within the ES.

Land take

2.5.9 A plan showing the anticipated permanent and temporary land acquisition required to deliver the scheme is contained within appendix A.2. The temporary land requirements for construction purposes has been so far estimated, although does represent a worst-case estimation, and a final version of the temporary land areas will be included as part of the ES. Any changes from the areas currently identified would incorporate a reduction in temporary land; no expansion is anticipated.

Demolition

2.5.10 It is anticipated that the scheme would require the demolition of 1 farm building adjacent to the A303 approximately 850 metres to the east of Podimore. This can be seen within the extents of the red line boundary, south east of the ‘Eastmead Lane (track)’ label, as identified on the environmental constraints plan contained within appendix A.1, More details on the anticipated demolition will be provided within the ES and the location will also be indicated on a plan within the ES.

Scheme construction

2.5.11 As part of the proposed scheme, the following elements are likely to be required during construction:

- Temporary traffic management areas, temporary working and storage areas, material stockpiles, construction compounds, haul roads, and provision for site compounds to be used during the construction period
- Enabling works including utility diversions as required

2.5.12 For this PEI report, assumptions associated with the types of construction works required have been made within each of the environmental discipline chapters to inform the assessment of likely significant effects. The types of construction elements that are likely to form part of the scheme include the following:

- Pre-construction and mobilisation activities e.g. establishing site compounds, works areas, topsoil storage
- Earthworks to include noise attenuation bunds
- Diversion of Statutory Undertakers (SU) and other apparatus
- Installation of attenuation features
- Ground water management
- Site clearance
- General excavation
- Backfilling and compaction of soil
- Earthworks, i.e. the construction of embankments and the relocation of spoil
- Placing concrete foundations, may include piling
- Laying of asphalt
- Installation of drainage, which will include excavation and placement of pipes and chambers
- Construction of structures, which may include lifting of beams into place.

2.5.13 Details of the construction methodology will be included as part of the ES, once it has been fully developed.

2.5.14 The ES will also describe any phased approach to construction, the likely duration and location of construction activities, any need for night-time working, and the anticipated numbers and types of vehicle movements associated with the construction phase.

2.5.15 The development of the construction strategy will aim to ensure that adverse effects are reduced to sensitive receptors as far as possible.

2.6 Construction, operation, and long term management

Construction stage

2.6.1 Construction is anticipated to start in March 2020, and the construction duration is anticipated to last for approximately 2.5 years.

Environmental mitigation and management during construction and operation

2.6.2 In accordance with Interim Advice Note (IAN) 183/14[6], an Outline Environmental Management Plan (OEMP) will be prepared for the proposed scheme as part of the ES, to manage any environmental effects of the proposed scheme and to demonstrate compliance with environmental legislation.

2.6.3 The OEMP would inform the Construction Environmental Management Plan (CEMP) to be produced by the Contractor at the construction stage and eventually the Handover Environmental Management Plan (HEMP) which will contain essential environmental information needed for the future maintenance and operation of the asset.

2.6.4 The overarching objective of an Environmental Management Plan (EMP) is to provide the framework for managing the environmental effects of projects, and to demonstrate compliance with environmental legislation. DMRB Volume 11, Section 2 describes the function of the EMP as primarily to highlight the project commitments to environmental designs, mitigation or enhancement measures and/or longer-term monitoring, which have been recommended in the assessment. It provides the basis on which monitoring and auditing of the delivery of the environmental performance of the scheme can be measured.

Short and long term maintenance requirements

2.6.5 Short-term maintenance and repair activities are likely to comprise inspections on the new works and installed assets, and any unplanned works due to damage to assets in events such as road traffic incidents. Longer term maintenance and repair works are likely to be required for the following scheme assets, such as:

- Road restraint
- Drainage
- Earthworks
- Pavement and paved areas
- Signs, signals and lighting equipment
- Structures
- Communications and transmission equipment

2.6.6 There would also be on-going (annual) inspections and general routine maintenance works such as grass cutting, sign cleaning, and litter picking.

2.6.7 In the longer term, expected planned maintenance would include activities such as resurfacing the road and replacement of assets when they become life expired.

2.6.8 At this stage, full maintenance and repair details for each of the above assets have not been generated for the scheme, but will be included as part of the ES.

[6] Highways England (2014) Interim Advice Note (IAN) 183/14: 'Environmental Management Plans'.

2.7 Consultation undertaken to date

2.7.1 Under Section 42 of the Planning Act 2008, the applicant (Highways England) has a duty to consult with the following about the proposed application:

(a) Such persons as may be prescribed
(b) Each local authority that is within section 43 (of the Planning Act)
(c) the Greater London Authority if the land is in Greater London
(d) each person who is within one or more of the categories set out in section 44 (including land owners and tenants, and those with relevant land interests).

2.7.2 An extensive stakeholder mapping exercise was undertaken in the summer of 2015 to identify relevant stakeholders and their key interests. A number of key stakeholders were identified with whom Highways England directly engaged with. Among the key stakeholders identified were the section 43 local authorities of Somerset County Council and South Somerset District Council, several parish councils, the Environment Agency, Natural England, Historic England and a number of local business and agricultural organisations.

2.7.3 A series of public events and invitation only meetings will be held with key stakeholders, the local community and landowners. Members of the project team will be available at events to discuss the scheme with members of the public.

2.7.4 The following consultation material will be made available at all meetings and events, on the scheme website and at public information points:

- consultation scheme brochure
- consultation scheme questionnaire and freepost envelope
- poster detailing public events and scheme website

2.7.5 All feedback and formal responses received during the statutory public consultation period will be recorded and will appear in summary as part of a consultation report.

2.7.6 The feedback and formal responses received during this statutory consultation may influence the final design of the scheme, ahead of submitting a DCO application to the Planning Inspectorate.

Environmental engagement with consultation bodies

2.7.7 In addition to engagement with local authorities, landowners, hard to reach groups, and the community as part of the non-statutory and statutory public consultations, Highways England has engaged with the following consultation bodies during the scheme development period:

- Environment Agency
- South West Heritage Trust (archaeological advisors to South Somerset District Council)

- Natural England
- Historic England
- Somerset County Council
- South Somerset District Council
- National Trust
- The Gardens Trust

2.7.8 A summary of the meetings is provided in Table 2.1 below. Consultation bodies were engaged through group meetings, telephone discussions and email channels.

Table 2.1: Consultation body meetings

Date	Stakeholders	Discussion / topics raised	Influence
4 December 2015	National Trust, Environment Agency, and Natural England	Introduction to the scheme and route options DCO process, project timescales and engagement methodology.	Representatives confirmed their interest in the scheme and engagement approach. Initial discussions about proposed scheme options.
22 March 2016	National Trust, Environment Agency, South West Heritage Trust and Natural England	Scheme update and public consultation strategy discussion.	Discussions about development of public consultation strategy and specific stakeholder identification and engagement activities. Discussion about communications channels to be employed.
13 July 2016	National Trust, Environment Agency, South West Heritage Trust and Natural England	Stakeholder engagement progress meeting. Discussion about public consultation activities timing.	Feedback about route options presented. Discussion about planned public consultation programme.
11 November 2016	National Trust, Environment Agency, South West Heritage Trust and Natural England	Stakeholder engagement progress meeting. Update about public consultation activities planned.	Consideration of specific stakeholder groups including, landowners, discussions, parish councils, local authority politicians and Members of Parliament.
22 March 2017	Historic England and South Somerset District Council	Site visit to view Hazlegrove Registered Park and Garden and potential design options in their locality.	Discussion around the level of potential impact for design options in this area, as well as potential mitigation. In addition, the requirement for more detailed assessment and methodology for that assessment was discussed.
2 May 2017	Natural England	Survey effect to date and going forward. Methodology for bat surveys (in light of emerging Natural England guidance). Future engagement and EIA process. Ghost licences.	Advice received on conducting bat surveys prior to DCO submission, including scope of those surveys. Broad agreement on scope for remainder of surveys. Natural England now have an awareness of the overall programme and requirement for on-going engagement.
4 July 2017	Environment Agency	Survey effect to date and going forward. Proposed drainage design and run-off rates. Flood risk assessment and Water Framework Directive assessment.	Survey and assessment focus and on-going consultation requirements.

2.7.9 Engagement with the Environment Agency, Natural England, Historic England, Somerset County Council and South Somerset District Council, as well as any other relevant environmental organisations including The Gardens Trust and the National Trust, will continue through the format of an Environmental Technical Working Group (TWG).

2.7.10 The Environmental TWG will be responsible for studying specific scheme issues, considering appropriate scheme solutions and seeking to agree statements of common ground (SoCGs) on environmental matters between Highways England and key stakeholders. The Environmental TWG will also be provide a format for technical review of the Environmental Impact Assessment (EIA) and associated surveys, development and review of environmental design, mitigation requirements and environmental opportunities and enhancements.

2.7.11 Consultation bodies have also been formally consulted as part of the EIA Scoping process and in order for the Planning Inspectorate to form a Scoping Opinion. Further information on EIA Scoping and consultation on this process is contained within section 4.1.

3 Assessment of alternatives

3.1 Assessment methodology

3.1.1 Initial option sifting was undertaken in accordance with the Transport Analysis Guidance – The Transport Appraisal Process or WebTAG. The sift used the Early Assessment Sifting Tool (EAST)[7], which forms part of Step 6 of WebTAG – Initial Sifting. However, as EAST does not provide a numeric score, the assessment team produced a scoring mechanism to allow each option to be directly compared and ranked.

3.1.2 Following the completion of the EAST sifting process, initial environmental assessment in accordance with the Design Manual for Roads and Bridges, a scoping level of assessment was undertaken for the reduced number of options. The environmental assessment was further refined for the two route options taken to public consultation during 2017, to a DMRB Simple level of assessment. The preferred option is now subject to a detailed environmental assessment, the preliminary findings of which are presented within this Preliminary Environmental Impact (PEI) report, with the full assessment to be reported within the Environmental Statement (ES).

3.2 Alternative options considered

3.2.1 Thirteen potential route options were originally identified to ensure a broad range of possibilities were considered. These can be broadly classified as central, northern, or southern routes:

- Central: Option A1, Option A1 (South), and Option A2 (now Option 1)
- Northern: Option B2, Option B4, Option D1, Option E1, Option E2, Option E4, Option F1 (now Option 2), and Option G1
- Southern: Southern Route (i), Southern Route (ii)

Sifting of options

Initial option sifting was undertaken in accordance with the Transport Analysis Guidance – The Transport Appraisal Process or WebTAG. The sift used the EAST, which forms part of Step 6 of WebTAG – Initial Sifting EAST allows for the analysis of options against economics, management, financial and commercial criteria, which includes environmental under the economic case.

3.2.2 On completion of the EAST process, the following short listed options were then taken forward for further assessment:

- Option B4
- Option F1 (became Option 2)
- Option A2 (became Option 1)

[7] Department for Transport (2011) Early Assessment Sifting Tool (EAST) (online) available at: https://www.gov.uk/government/publications/transport-business-case (last accessed December 2017).

- Option E4

3.2.3 The 4 shortlisted options were subject to a technical appraisal, which concluded that 1 central and 1 northern route option should be taken forward to the non-statutory public consultation which was held in February and March 2017. These 2 options, Option 1 and Option 2, were subject to further environmental, economic, and technical assessment. The results of these assessments, along with the outcomes of the consultation, were used to inform the identification of the Preferred Route which was announced as Option 1 in October 2017.

3.2.4 This Preliminary Environmental Information (PEI) Report has therefore been prepared for Option 1 and the Environmental Statement (ES) will be produced following this report.

3.2.5 The Assessment of Alternatives presented within the ES will examine the design variations of the preferred route, in line with the Infrastructure Planning (EIA) Regulations 2017, including:

3.2.6 '*a description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed scheme and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects'*

3.2.7 This will demonstrate the rationale and decisions made for the final preliminary design to be submitted as part of the Development Consent Order (DCO) application.

4 Environmental assessment methodology

4.1 Environmental scoping

4.1.1 The purpose of the scoping process is to determine which environmental factors (topics) should be included in the Environmental Statement (ES), and the level of detail to which they should be assessed.

4.1.2 An Environmental Impact Assessment Scoping Report was produced in November 2017. It was completed in accordance with the Design Manual for Roads and Bridges (DMRB) Volume 11[8] and the Planning Inspectorate Advice Note Seven[9], to a Scoping level for all environmental factors contained within Highways England's Interim Advice Note (IAN) 125/15[10], plus any additional factors introduced to the assessment by the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the 'EIA Regulations'). The Environmental Impact Assessment Scoping Report was informed by information gathered through desk top studies, initial environmental walkovers and surveys, and by the environmental assessment work carried out to inform the preferred option selection.

4.1.3 The Environmental Impact Assessment Scoping Report was submitted to the consultation bodies by the Planning Inspectorate and the responses from the consultation bodies have been taken into account in adopting the Scoping Opinion. A list of those consultees who responded can be seen found within Appendix 2 of the Scoping Opinion.

4.1.4 The Scoping Opinion was received from the Planning Inspectorate on 9 January 2018. Due to the limited time between the publication of this Preliminary Environmental Information (PEI) report and the receipt of the Scoping Opinion from the Planning Inspectorate, the comments within the Scoping Opinion have not been incorporated into the environmental assessments contained within this report. However, all relevant consultees will be contacted to further discuss the assessment scope as per the Scoping Opinion, and the ES will include a schedule of responses received from the Planning Inspectorate to explain and identify how each of the comments have been addressed.

4.1.5 EIA scoping is an iterative process and will therefore additionally take into account comments received as part of the statutory consultation, for which

[8] Highways Agency (2008) Design Manual for Roads and Bridges, Volume 11 'Environmental Assessment' [online] available at: http://www.standardsforhighways.co.uk/ha/standards/dmrb/vol11/section1.htm (last accessed December 2017).
[9] The Planning Inspectorate (December 2017) 'Environmental Impact Assessment: Process, Preliminary Environmental Information and Environmental Statements (Version 6) [online[available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2015/03/Advice-note-7v4.pdf (last accessed January 2018).
[10] Highways England (2015) Interim Advice Note 125/15 'Environmental Assessment Update' [online] available at: http://www.dmrb.net/ha/standards/ians/pdfs/ian125r2.pdf (last accessed December 2017).

further details are provided within Section 2.7 of this document. The preliminary assessment presented in Chapters 5 to 15 will be updated within the ES, to take into consideration the Scoping Opinion and any additional comments received as part of the consultation process. The ES will be submitted alongside the Development Consent Order (DCO) application.

4.2 Approach to assessment

4.2.1 This PEI report considers the following factors contained in Regulation 5(2) of the EIA Regulations. These include:

(a) Population and human health
(b) Biodiversity
(c) Land, soil, water, air and climate
(d) Material assets, cultural heritage and the landscape
(e) The interaction between the factors referred to in sub-paragraphs (a) to (d)

4.2.2 The assessment for each of these factors are covered in 1 or more environmental assessment chapters in this report. The chapters have been written in accordance with the requirements presented in the Design Manual for Roads and Bridges (DMRB) Volume 11 Section 3[11] and Interim Advice Note (IAN) 125/15[12], for each of the relevant environmental factors (topics). This is shown in Table 4.1 below.

Table 4.1: Environmental factors and respective DMRB environmental topics

Factors contained within Regulation 5(2) of the Infrastructure Planning (EIA) Regulations	DMRB Topic
(a) Population and human health	Chapter 5 Air Quality Chapter 11 Noise and Vibration Chapter 12 People and Communities
(b) Biodiversity	Chapter 9 Biodiversity
(c) Land, soil, water, air and climate	Chapter 5 Air Quality Chapter 8 Geology and Soils Chapter 14 Climate
(d) Material assets, cultural heritage, and the landscape	Chapter 6 Cultural Heritage Chapter 7 Landscape and Visual Effects Chapter 10 Materials
(e) The interaction between the factors referred to in sub-paragraphs (a) to (d).	Chapter 15 Combined and Cumulative Effects

4.2.3 The stages of construction and operation are considered for each of the environmental factors. The scheme would be unlikely to be decommissioned as it would form part of and remain an integral part of the strategic road network (SRN). As such, decommissioning has not been considered within this PEI report and decommissioning will be scoped out of the ES.

[11] Highways England (2015) Design Manual For Roads and Bridges (DMRB) Volume 11 Environmental Assessment, Section 3 Environmental Assessment Techniques.
[12] Highways England (2015) Interim Advice Note (IAN) 125/15 Environmental Assessment Update [online] available at: http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian125r2.pdf (last accessed November 2017).

Population and human health

4.2.4 There is no consolidated methodology or practice for the assessment of population and human health, however the scope of the assessment is considered to be covered by existing Highways England Guidance as set out below. This recognises the specific requirements of the National Policy Statement for National Networks (NPSNN)[13] for consideration of health, specifically within paragraphs 4.79 - 4.82. This will address health by utilising the following guidance:

- Air Quality: HA 207/07[14], IAN 185/15[15], IAN 175/13[16], IAN 174/13[17], IAN 170/12[18]
- Noise and vibration: HD 213/11[19], IAN 185/15[20]
- Equestrians, Cyclists, and Community Effects: DMRB Volume 11 Section 3 Part 8[21]

4.2.5 Reporting of population and human health effects will be provided within the relevant environmental factor chapters. The ES will set out the methodology recognising the requirements of the NPSNN, including how significance of effects are to be determined.

4.2.6 It is considered that these assessments, conducted principally in isolation as is required by their methodologies, will not provide a sufficient analysis of the effects of the scheme. To enable such conclusions to be drawn, a qualitative assessment of information collated via each of the environmental factors listed

[13] Department for Transport (2015) National Policy Statement for National Networks [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/387223/NNNPS-web.pdf (last accessed November 2017).
[14] Highways England (2008) DMRB Volume 11 Section 2 Part 1 HA207/07 'Air Quality'.
[15] Highways England (2015) IAN 185/15 'Updated traffic, air quality and noise advice on the assessment of link speeds and generation of vehicle data into 'speed-bands' for users of DMRB Volume 11 Section 3 Part 1 Air Quality and Volume 11 Section 3 Part 7 Noise' [online] available at: http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian185.pdf (last accessed October 2017).
[16] Highways England (2013) IAN 175/13 'Updated air quality advice on risk assessment related to compliance with the EI Directive on ambient air quality and on the production of Scheme Air Quality Action Plans for user of DMRB Volume 11, Section 3, Part 1 Air Quality' [online] available at: http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian175.pdf (last accessed October 2017).
[17] Highways England (2013) 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)' [online] available at: http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian174.pdf (last accessed October 2017).
[18] Highways England (2013) IAN 170/12 v3 'Updated air quality advice on the assessment of future Nos and NO2 projections for users of DMRB Volume 11, Section 2, Part 1 Air Quality' [online] available at: http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian170v3.pdf (last accessed October 2017).
[19] Highways England (2011) DMRB Volume 11 Section 3 Part 7 HD 213/11 Noise and Vibration.
[20] Highways England (2015) IAN 185/15 'Updated traffic, air quality and noise advice on the assessment of link speeds and generation of vehicle data into 'speed-bands' for users of DMRB Volume 11 Section 3 Part 1 Air Quality and Volume 11 Section 3 Part 7 Noise' [online] available at: http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian185.pdf (last accessed October 2017).
[21] Highways England (2008) DMRB Volume 11 Section 3 Part 8 'Pedestrians, Cyclists, Equestrians and Community Effects'.

in section 4.2.4 above will be undertaken and presented within the Combined and Cumulative Effects chapter of the ES.

Major accidents and disasters

4.2.7 The EIA 2017 require an assessment of '*the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned*'.

4.2.8 The scope of the assessment will cover:

- Vulnerability of the project to risks of major accidents and/or disasters
- Any consequential changes in the predicted effects of that project on environmental factors

4.2.9 To address the requirements of the EIA Regulations, the factor of major accidents and disasters will be assessed as part of the ES. In considering the elements of vulnerability, professional judgement will be applied to develop project specific definitions of major events. Major events, both man-made and naturally occurring, will be identified and any potential effects and likely mitigation measures will be included as part of the assessment. The conclusions of this assessment will be included within each of the individual environmental chapters of the ES.

Heat and radiation

4.2.10 Due to the nature of the scheme, it is considered unlikely that heat and radiation effects associated with the proposals are likely to arise. Further assessment as part of the ES has therefore been scoped out.

Future baseline scenario

4.2.11 A description of the relevant aspects of the current state of the environment (baseline scenario) is included for each environmental factor within chapters 5 to 15 of this report. Within the ES, an outline of the likely evolution of the baseline and future baseline scenarios, without implementation of the scheme and appraising only natural changes, will be included. This will make use of readily available information such as that available from Local Development Plan documents.

4.3 Surveys and predictive techniques and methods

4.3.1 This PEI report reviews the information gathered as part of the ongoing EIA for each environmental factor, and presents the assessment carried out to date. This will be updated for the ES, which will be submitted with the DCO application. The data gathering work undertaken is presented in each topic chapter of this report (chapters 5 to 15), but generally comprises the following elements:

- Consultation with third-party organisations, such as local councils, to obtain information
- Desk-based studies
- Field surveys, such as Phase 2 ecology surveys

4.4 General assessment assumptions and limitations

4.4.1 General assumptions are contained below. Topic-specific assumptions and limitations have been outlined in each of the individual environmental topic chapters (chapters 5 to 15).

Scheme designs

4.4.2 This PEI report is based on the scheme design as presented as part of the consultation in January 2018 (refer to section 2.5 for further information). Further design development is ongoing and will take into account the responses from the consultation. This information will be available for the ES.

4.4.3 The red line boundary shown within both appendix A.1 and appendix A.2 has been updated following the publication of the Environmental Impact Assessment Scoping Report, which was submitted to the Planning Inspectorate in November 2017. The key changes include the following:

- The inclusion of an additional haul route to the south of the scheme.
- The alignment of the northern haul route has moved south to reduce ecological effects.
- The drainage basin at the western end of the scheme in now longer but hugs the carriageway so is narrower.
- The inclusion of a drainage basin at Plowage Lane.
- The red line boundary now hugs the existing highway fence at both the Scheduled Monument (Romano-British settlement immediately south west of Camel Hill Farm) and the MoD site.
- Additional land is now included on the southern side of the road at Traits Lane for material storage, as advised by the delivery partner.
- The inclusion of an additional small strip of land near Glebe Farm, West Camel, due to further knowledge of the statutory diversions.
- The inclusion of the existing A303 carriageway to be de-trunked, by Plowage Lane and Ridge Copse (for access to the diner and petrol station).
- Land take has reduced at Steart Hill link due to the removal the connection between Traits Lane and Camel Hill, via an underbridge
- Land take has slightly increased at Camel Cross junction due to the change in junction design from a roundabout to a compact junction.
- The inclusion of noise bunds and false cuttings in areas requiring environmental mitigation.

South West Regional Traffic Model (SWRTM) assumptions

4.4.4 The base traffic model is for a March 2015 weekday (excluding school holidays and bank holidays). The base model is an average hour model, with the AM

model representing an average hour in the period 7am-10am, the inter-peak (IP) an average hour from 10am-4pm, and the PM an average hour from 4pm-7pm.

4.4.5 The model was built using SATURN, which is a standard software model used to predict future traffic flows.

Base model assumptions

4.4.6 Based on the South West Regional Traffic Model (SWRTM) base model and the A303 Sparkford to Ilchester / A358 Taunton to Southfields Stage 1 local traffic models, and represents average March 2015 weekday as per the SWRTM.

4.4.7 The base model has been calibrated in line with WebTAG Unit M3.1[22].

Forecast model assumptions

4.4.8 An Opening Year of 2023 and a Design Year of 2038 will be used.

4.4.9 An Uncertainty Log covering future network and developments will be formed using the uncertainty work generated as part of the early assessment work and any updates received from local authorities and Highways England.

4.4.10 Forecast car and rail growth are based on TEMPRO 7.2 and LGV/HGV growth are derived using Road Traffic Forecasts (RTF) 2015[23]. Development trip generation is based on TEMPRO and TRICS.

4.4.11 Variable Demand Modelling (VDM) is consistent with WebTAG M2[24] and based on DIADEM/HEIDI as per the SWRTM.

4.5 Significance criteria

4.5.1 The output of the environmental assessment is to report the likely significance of effects using established significance criteria, as presented within the DMRB Volume 11, Section 2, Part 5[25]. This requires an assessment of the receptor or resource's environmental value (or sensitivity) and the magnitude of the scheme's impacts (change).

4.5.2 The DMRB states that the approach to assigning significance of effect relies on reasoned argument, professional judgement and taking on board the advice and views of appropriate organisations. For some factors, predicted effects may

[22] Department for Transport (January 2014) TAG Unit M3.1: Highway Assignment Modelling [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/427124/webtag-tag-unit-m3-1-highway-assignment-modelling.pdf (last accessed August 2017).
[23] Department for Transport (2015) Road Traffic Forecasts 2015 [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/411471/road-traffic-forecasts-2015.pdf (last accessed August 2017).
[24] Department for Transport (March 2017) TAG Unit M2: Variable Demand Modelling. [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/603266/webtag-tag-unit-m2-variable-demand-modelling-march-2017.pdf (last accessed August 2017).
[25] Highways England (2008) DMRB Volume 11, Section 2, Part 5 HA 205/08 'Assessment and Management of Environmental Effects'.

be compared with quantitative thresholds and scales in determining significance. Each environmental assessment chapter within the ES will describe the specific thresholds / criteria used to determine value / magnitude / sensitivity and will align within the general methodology described within this section.

4.5.3 Assigning each effect to 1 of the 5 significance categories enables different environmental factor issues to be placed upon the same scale, to assist the decision-making process at whatever stage the project is at within that process. These 5 significance categories are set out in Table 4.2 below.

Table 4.2: Descriptions of the significance of effect categories

Significance category	Typical descriptors of effects
Very Large	Only adverse effects are normally assigned this level of significance. They represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may also enter this category.
Large	These beneficial or adverse effects are very important considerations and are likely to be material in the decision-making process.
Moderate	These beneficial or adverse effects may be important, but are not likely to be key decision-making factors. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse effect on a resource or receptor.
Slight	These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process, but are important in enhancing the subsequent design of the project.
Neutral	No effects or those that are beneath levels of perception, within normal bounds or variation or within the margin of forecasting error.

Source: DMRB Volume 11, Section 2, Part 5, Table 2.3

4.5.4 The environmental value will be identified for each of the receptors identified within the individual environmental factor that have been carried forward from the Scoping exercise for further environmental assessment, along with the magnitude of change. Five significance categories can result from the assessment, as defined in Table 4.3. It is important to note that significance categories are required for positive (beneficial) as well as negative (adverse) effects. The greater the magnitude of impact, the greater significant the effect. For example, the consequences of a highly valued environmental resource suffering a major detrimental impact would be a Large or Very Large adverse effect.

4.5.5 Impacts that are Moderate Beneficial / Adverse or above will be considered significant.

Table 4.3: Assessing significance of potential effects

Environmental value (sensitivity)	Magnitude of potential impact (degree of change)					
	No change	**Negligible**	**Minor**	**Moderate**	**Major**
Very High	Neutral	Slight	Moderate or Large	Large or Very Large	Very Large
High	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large
Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
Negligible	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight

Source: DMRB Volume 11, Section 2, Part 5, Table 2.4

4.6 Mitigation measures

4.6.1 Priority has been given to the avoidance of effects at source where practicable, whether through the design of the scheme or by regulating the timing or location of activities. Where it has not been possible to avoid significant negative effects, opportunities have been sought to reduce the effects, ideally to the point where they are no longer significant. Mitigation measures fall into 3 broad categories:

- **Mitigation** in the strict sense – i.e. measures taken to avoid or reduce negative effects. Measures may include locating the development and its working areas and access routes away from areas of high environmental sensitivity, fencing off sensitive areas during the construction period, or timing works to avoid sensitive periods
- **Compensation** – the use of replacement areas to make up for the loss of, or permanent damage to resources. Any replacement area should be similar to or, with appropriate management, have the ability to reproduce the functions and conditions of those resources that have been lost or damaged.
- **Offsetting** – the provision of a benefit that is related to the effect, but is not a like-for-like replacement of the feature to be lost.

4.6.2 Mitigation measures will further be developed during the production of the ES. In addition, where practicable the scheme will seek to provide environmental enhancements as part of the scheme design. Such measures have not yet been confirmed, but will be included as part of the ES. Chapters 5 to 15 have provided a list of potential enhancement measures.

5 Air quality

5.1 Introduction

5.1.1 This chapter presents the on-going work for the assessment of the potential air quality effects of the scheme. Potential changes in air quality at sensitive receptors as a result of the scheme are considered with reference to relevant policy and legislation, and in the context of existing air quality in the study area.

5.1.2 The construction phase of the scheme has the potential to result in temporary air quality impacts from the emission of dust, which can cause a nuisance in the form of dust soiling and elevated concentrations of fine particulates (particulate matter smaller than 10µm in aerodynamic diameter; PM_{10}). The operational phase of the scheme has the potential to affect air quality due to:

- Changes in vehicular emissions and pollutant concentrations resulting from changes in the flow, speed and composition of traffic on the road network
- Changes in road layout and alignment, leading to changes in the distance between vehicular emission sources and receptors

5.1.3 The potential effects have been considered following the guidance contained in DMRB Volume 11 Section 3, Part 1 – Air Quality (HA207/07)[26] and the associated Interim Advice Notes (IANs), namely IAN 170/12[27], 174/13[28], 175/13[29] and 185/15[30]. Further detailed assessment is currently under way, and will be reported within the Environmental Statement (ES) that will be submitted to support the Development Consent Order (DCO) application.

5.1.4 The scheme has the potential to cause air quality effects, both positive and negative, during the construction and operational phases. The air quality topic encompasses two sub-topics:

- Local air quality, which is concerned principally with emissions of pollutants that are of concern to human health, vegetation and ecosystems, at a local level
- Regional effects, which are concerned with total emissions of pollutants that can disperse over longer distances, affecting human health, vegetation and ecosystems

[26] Highways Agency (2007) Design Manual for Roads and Bridges, Volume 11, Section 3, Part 1, HA 207/07, Air Quality.
[27] Highways Agency (2012) IAN 170/12: Updated air quality advice on the assessment of future NOx and NO2 projections for users of DMRB Volume 11, Section 3, Part 1 'Air Quality' (HA207/07).
[28] Highways Agency (2013) IAN 174/13: Update advice for evaluating significant local air quality effects for users of DMRB Volume 11, Section 3, Part 1 'Air Quality' (HA207/07).
[29] Highways England (2013) IAN 175/13: Updated air quality advice on risk assessment related to compliance with the EU Directive on ambient air quality and on the production of Scheme Air Quality Action Plans for users of DMRB Volume 11, Section 3, Part 1 'Air Quality' (HA207/07).
[30] Highways England (2015) IAN 185/15: Updated traffic, air quality and noise advice on the assessment of link speeds and generation of traffic data into speed bands for users of DMRB Volume 11, Section 3, Part 1 'Air Quality'.

5.2 Legislation and policy context

5.2.1 The following legislation and policy are relevant to the proposed scheme.

European Union

5.2.2 Directive 2008/50/EC[31] on ambient air quality and cleaner air for Europe was adopted in May 2008. This Directive defines limit values and times by which they are to be achieved for the purpose of protecting human health and the environment by avoiding, reducing or preventing harmful concentrations of air pollutants.

5.2.3 Directive 2008/50/EC[32] sets out that the Limit Values apply everywhere with the exception of:

a) Any locations situated within areas where members of the public do not have access and there is no fixed habitation
b) In accordance with Article 2(1), on factory premises or at industrial installations to which all relevant provisions concerning health and safety at work apply
c) On the carriageway of roads
d) On the central reservations of roads except where there is normally pedestrian access to the central reservation

5.2.4 Defra assesses and reports on the compliance with the Air Quality Directive for each of the 43 zones and agglomerations across the UK.

National legislation and policy

Air quality legislation

5.2.5 The Air Quality Standards Regulations 2010[33] came into force in June 2010, which implement EU Directive 2008/50/EC on ambient air quality for the UK.

5.2.6 Part IV of the Environment Act 1995[34] requires that every local authority shall periodically carry out a review of air quality within its area, including likely future air quality. As part of this review, the local authority must assess whether air quality objectives (AQO) are being achieved, or likely to be achieved within the relevant periods. Any parts of a local authority's area where the AQOs are not being achieved, or are not likely to be achieved within the relevant period, must be identified and declared as an Air Quality Management Area (AQMA). Once such a declaration has been made, authorities are under a duty to prepare an Action Plan which sets out measures to pursue the achievement of the AQOs within the AQMA.

[31] European Union (April 2008) Directive on Ambient Air Quality and cleaner Air for Europe, Directive 2008/50/EC Official Journal (Volume 152, pp 0001-0044).
[32] European Union. (April 2008) Directive on Ambient Air Quality and cleaner Air for Europe, Directive 2008/50/EC Official Journal, vol. 152, pp. 0001-0044.
[33] Statutory Instrument (2010) The Air Quality Standard Regulations, No. 1001.
[34] Defra (2003) Part IV of the Environment Act 1995 Local Air Quality Management.

5.2.7 The AQOs, specifically for use by local authorities in carrying out their air quality management duties, are set out in the Air Quality (England) Regulations 2000[35] and the Air Quality (England) (Amendment) Regulations 2002[36].

5.2.8 The Air Quality Strategy (AQS) establishes the UK framework for air quality improvements. The air quality objectives in the AQS are a statement of policy intentions and policy targets. As such, there is no legal requirement to meet these objectives, although authorities are also required to work towards achieving the Strategy's objectives.

5.2.9 The AQOs and limit values relevant to the assessment are summarised in Table 5.1 below.

Table 5.1: Air quality objectives and limit values

Pollutant	Averaging Period	Air Quality Objectives and Limit Values		Attainment Date	
		Concentration	Allowance	Air Quality Objectives	EU Limit Values
Nitrogen dioxide (NO_2)	Annual	40 µg/m^3	-	31 December 2005[(a)(b)]	1 January 2010[(c)]
	1 Hour	200 µg/m^3	18	31 December 2005[(a)(b)]	1 January 2010[(c)]
Nitrogen Oxides (NO_X)[(d)]	Annual	30 µg/m^3	-	1st January 2001[(c)]	
Particulates (PM_{10})	Annual	40 µg/m^3	-	31 December 2004[(a)(b)]	1 January 2005[(c)]
	24 Hour	50 µg/m^3	35	31 December 2004[(a)(b)]	1 January 2005[(c)]

Notes: [(a)] Air Quality (England) Regulations 2000 as amended in 2002.
[(b)] Air Quality Strategy 2007.
[(c)] EU Directive 2008/50/EEC on ambient air quality and cleaner air for Europe and The Air Quality Standards Regulations 2010. Derogations (time extensions) have been agreed by the EU for meeting the NO_2 limit values in some zones/agglomerations.
[(d)] Designated for the protection of vegetation and ecosystems and referred to as the 'critical level' for NO_x.

5.2.10 The AQOs only apply in locations of relevant exposure. Table 5.2 provides details of where the respective objectives should and should not apply, and therefore the types of receptors that are relevant to the assessment of air quality.

[35] Statutory Instrument. (2000) Air Quality (England) Regulations, No. 928.
[36] Statutory Instrument. (2002) Air Quality (England) (Amendment) Regulations, No. 3043.

Table 5.2: Locations where the air quality objectives should and should not apply

Averaging period	Objectives should apply at:	Objectives should not apply at:
Annual	All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, care homes etc.	Building façades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short-term.
24 Hour	All locations where the annual mean objective would apply, together with hotels. Gardens of residential properties.	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short-term.
1 Hour	All locations where the annual mean and 24-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets). Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more. Any outdoor locations where members of the public might reasonably be expected to spend one hour or longer.	Kerbside sites where the public would not be expected to have regular access.

Source: Department for Environment, Food and Rural Affairs (2016), Local Air Quality Management – Technical Guidance (TG16).

Construction dust legislation

5.2.11 Section 79(1)(d) of the Environmental Protection Act 1990[37] 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. Failure to comply with an abatement notice is an offence. However, it is a defence if an operator employs the best practicable means to prevent or to counteract the effects of the nuisance.

[37] Parliament of the United Kingdom (1990) Environmental Protection Act 1990.

Air quality policy

National Policy Statement for National Networks (2014)

5.2.12 The National Policy Statement for National Networks[38] (NPSNN) notes that the applicant should undertake an assessment of the impacts of the proposed project as part of the Environmental Statement (ES), which should describe:

- *Existing air quality levels*
- *Forecasts of air quality at the time of opening, assuming that the scheme is not built (the future baseline) and taking account the impact of the scheme*
- *Any significant air quality effects, their mitigation and any residual effects, distinguish between the construction and operation stages and taking account of the impact of road traffic generated by the project*

5.2.13 Paragraphs 5.12 and 5.13 of the NPSNN provides advice for decision makers:

"5.12 The Secretary of State must give air quality considerations substantial weight where, after taking into account mitigation, a project would lead to a significant air quality impact in relation to EIA and / or where they lead to a deterioration in air quality in a zone / agglomeration."

"5.13 The Secretary of State should refuse consent where, after taking into account mitigation, the air quality impacts of the scheme will:

- *Result in a zone / agglomeration which is currently reported as being compliant with the Air Quality Directive becoming non-compliant*
- *Affect the ability of a non-compliant area to achieve compliance within the most recent timescales reported to the European Commission at the time of the decision"*

5.2.14 Advice set out in Highways England's Interim Advice Notes (IAN) 174/13[39] and 175/13[40] ensures that an assessment to inform the reasonable and robust decision making on the judgements of significant air quality effects (NPSNN para 5.12) and determining whether a scheme would affect the UK's reported ability to comply with the Air Quality Directive (NPSNN para 5.13) can be completed and evaluated in line with the requirements of the NPSNN.

[38] 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 August 2017).
[39] Highways England (2013) Interim Advice Note 174/13 Updated advice for evaluating significant local air quality effects for users of DMRB, Volume 11, Section 3, Part 1 'Air Quality' (HA 207/07).
[40] Highways England (2013) Interim Advice Note 175/13 Updated air quality advice on risk assessment related to compliance with the EU Directive on ambient air quality and on the production of Scheme Air Quality Action Plans for user of DMRB Volume 11, Section 3, Part 1 Air Quality.

5.3 Assessment methodology

5.3.1 The assessment methodology for all air quality assessment work completed to date to inform this PEI report, including model verification, can be found in appendix B.1 and appendix B.2.

5.3.2 The assessment methodology for defining the significance of effects upon air quality to be used to develop the air quality chapter within the ES is contained within section 6.11 of the Environmental Impact Assessment (EIA) Scoping Report submitted to the Planning Inspectorate in November 2017. The EIA Scoping report can be accessed here:

5.3.3 https://infrastructure.planninginspectorate.gov.uk/projects/south-west/a303-sparkford-to-ilchester/?ipcsection=docs.

5.4 Study area

Local assessment

5.4.1 The local air quality assessment involves estimating the change in pollutant concentrations at sensitive receptors resulting from the operation of the scheme. The study area for the local air quality assessment covers human health receptors (appendix B.3) and designated sites (appendix B.4) within 200m of roads that are expected to be affected by the scheme. The local ARN from the previous assessment (refer to section 5.8 for differences between the previous and current assessments) is shown in appendix B.5.

5.4.2 Under DMRB Volume 11, Section 3, Part 1 (HA 207/07), affected roads are defined where:

- Road alignment will change by 5m or more
- Daily traffic flows will change by 1,000 Annual Average Daily Traffic (AADT) flow or more
- Heavy Duty Vehicle (HDV) flows will change by 200 AADT or more
- Daily average speed will change by 10kph or more
- Peak hour speed will change by 20kph or more

5.4.3 The majority of the affected links identified for the scheme met the 1,000 AADT criteria.

5.4.4 The traffic model predicted that the scheme would lead to an increase of approximately 2,000-3,000 vehicles a day on the section of the A303 near Sparkford and Ilchester. This change is likely due to the improved alignment along the A303 which encourages traffic to use this section of the A303 instead of local B roads and some reassignment from the M4 and A35 corridors. This increase in AADT along the A303 covers a large distance beyond the scheme extents. The local ARN for the scheme extends approximately 90km from Winterbourne Stoke to Buckland St Mary.

Regional assessment

5.4.5 The regional air quality assessment assesses the change in emissions resulting from the scheme. This is required as emissions not only affect local air quality, but also have an effect on a regional, national and international scale.

5.4.6 The criteria stated in DMRB which was used to determine the regional affected road network is presented below:

- A change of more than 10% in AADT
- A change of more than 10% to the number of HDVs
- A change in daily average speed of more than 20 km/hr

5.4.7 Similar to the local assessment, the majority of the affected road links meet the AADT criteria. The drawing contained within appendix B.6 presents the locations of the regional ARN for the scheme.

5.5 Existing baseline

5.5.1 Information on air quality in the UK can be obtained from a variety of sources including Local Authorities, national network monitoring sites and other published sources. For the purpose of this assessment, data has been obtained from South Somerset District Council, Department for Environment Food and Rural Affairs (Defra) and Highways England. The most recent full year of bias adjusted monitoring data available from South Somerset District Council is for 2016.

Local authority review and assessment

5.5.2 In 2002/03, South Somerset District Council declared an AQMA in Yeovil due to monitored and modelled exceedances of the NO_2 annual mean air quality objective. These exceedances were primarily associated with the A30 and A37 but the whole town of Yeovil was declared an AQMA as *"a town wide action plan would be required to manage the local and through traffic."*

5.5.3 The Yeovil AQMA is located approximately 7 kilometres south of the scheme and is outside the local ARN of the scheme in the Opening Year. Therefore, changes in traffic characteristics that may lead to a significant air quality effect are not expected to occur within Yeovil. On this basis, the scheme is not expected to have an effect on the Yeovil AQMA in the Opening year.

Automatic monitoring

5.5.4 South Somerset District Council does not currently undertake any automatic monitoring. The automatic monitoring site at Yeovil District Hospital, which monitored NO_2 and PM_{10}, was removed following failure of the equipment and has not been replaced.

5.5.5 The nearest automatic monitoring site to the scheme is the Defra Automatic Urban and Rural Network (AURN) rural background site at Charlton Mackrell, approximately 6 kilometres northwest of the scheme. This monitoring site is

considered representative of background concentrations. Tables 5.1 and 5.2 below present the latest results from the Charlton Mackrell monitoring site. For the past 3 years, annual and hourly NO_2 concentrations at this site have been well below their respective objectives.

Table 5.1: Annual automatic monitoring data for NO_2

Site name	Site classification	National grid reference		Annual mean NO_2 concentration (µg/m^3)		
		X	Y	2014	2015	2016
Charlton Mackrell	Rural background	352196	128768	6.6	6.0	7.4

Source: Defra UK AIR 2017
Note: Annual Mean Objective is 40 µg/m^3
All results presented have >99% data capture

Table 5.2: Hourly automatic monitoring data for NO_2

Site name	Site classification	National grid reference		Number of hours NO2 concentrations were greater than 200 µg/m3		
		X	Y	2014	2015	2016
Charlton Mackrell	Rural background	352196	128768	0	0	0

Source: Defra UK AIR 2017
Note: Hourly mean objective is 200 µg/m^3 not to be exceeded for more than 18 hours per calendar year
All results presented have >99% data capture

Diffusion tube monitoring

5.5.6 South Somerset District Council currently undertakes diffusion tube monitoring at 20 sites to assess compliance with the annual mean NO_2 air quality objective. These monitoring sites are located approximately 7 to 10 kilometres south of the scheme within the Yeovil AQMA and exceedances of the annual mean NO_2 objective were found at five sites in 2016. However, as none of these monitoring sites are located within the study area of the scheme, and therefore do not represent relevant exposure of receptors likely to affected by the scheme, are not discussed further.

5.5.7 A 6 month air quality monitoring survey was undertaken by Highways England from January 2016 to June 2016. Monitoring was carried out and reported at 16 locations along roads near the scheme as well as at the Charlton Mackrell AURN. The results from monitoring were bias adjusted and annualised in accordance with Defra's Local Air Quality Management Technical Guidance (TG16), as described in appendix B.6.

5.5.8 This monitoring survey concluded that NO_2 concentrations within the vicinity of the scheme are well below the annual mean NO_2 air quality objective. The greatest annual mean NO_2 concentration within the vicinity of the scheme of 29.7µg/m^3 was recorded at the Hawk House B&B monitoring site, on the existing A303.

5.5.9 The bias adjusted and annualised results from this monitoring survey are presented in Table 5.3 below. The locations of these monitoring sites in relation to the scheme is presented in appendix B.7.

Table 5.3: Project specific diffusion tube monitoring data for NO_2

Site ID	Location	Site classification	National grid reference		Bias adjusted and Annualised NO_2 ($\mu g/m^3$)
			X	Y	2016
A303SPAR_001_1215	Chapel Cross Tearoom	Roadside	363096	126330	13.3
A303SPAR_002_1215	Brains Lane	Roadside	360781	126516	11.7
A303SPAR_003_1215	A359	Roadside	360913	126904	13.3
A303SPAR_004_1215	High Street	Roadside	360471	126423	18.7
A303SPAR_005_1215	Gason Hill	Roadside	358967	125551	19.7
A303SPAR_006_1215	Steart Hill 1	Roadside	357851	125391	19.8
A303SPAR_007_1215	Steart Hill 2	Roadside	357435	126624	7.7
A303SPAR_008_1215	A303 West of Howell Hill	Roadside	357724	125321	25.6
A303SPAR_009_1215	Plowage Lane	Roadside	357074	125029	28.6
A303SPAR_010_1215	A303 Hawk House B&B	Roadside	356760	124922	29.7
A303SPAR_011_1215	Church Street	Roadside	354621	125071	14.4
A303SPAR_012_1215	Higher Farm Lane	Roadside	354653	125228	16.4
A303SPAR_013_1215	Heathcote Road	Roadside	354326	123937	13.7
A303SPAR_014_1215	Somerton Road	Roadside	352190	123964	20.8
A303SPAR_015_1215	Queen Street	Roadside	349768	120271	13.7
A303SPAR_016_1215	Colocation Charlton Mackrell AURN	Rural Background	352196	128768	7.5
A303SPAR_017_1215	Colocation Charlton Mackrell AURN	Rural Background	352196	128768	7.0
A303SPAR_018_1215	Colocation Charlton Mackrell AURN	Rural Background	352196	128768	7.2

Note: Annualisation factor = 1.08, bias adjustment factor = 0.94. Annual NO_2 AQO = 40µg/m^3

Summary

5.5.10 Scheme specific monitoring data indicates that annual mean NO_2 concentrations are well below the annual NO_2 AQO in the study area. Nearby automatic monitoring at Charlton Mackrell also recorded NO_2 concentrations which were well below the short and long-term NO_2 AQOs. While some exceedances were recorded by South Somerset District Council diffusion tube sites in the Yeovil AQMA, these exceedances occurred at sites outside the study area. It is expected that air quality at receptors within the study area would currently meet the relevant NO_2 AQOs.

5.6 Value (sensitivity of resources and receptors)

5.6.1 IAN 174/13 provides advice for evaluating significant local air quality effects for public exposure and Designated Sites. Evaluation of the significance of local air quality effects will be undertaken in accordance with IAN 174/13, a summary of which is provided here.

5.6.2 The difference in pollutant concentrations between the Do-Minimum and Do-Something scenario is used to describe the 'magnitude' of change in

accordance with Table 5.4. The larger the magnitude of change, the more certainty there is that there will be an impact as a result of the proposed scheme. Where the scheme impact on concentrations is less than 1% of the air quality threshold, then the change at these receptors is considered to be imperceptible, and these receptors are scoped out of the judgement on significance.

Table 5.4: Magnitude of change criteria

Magnitude of change in concentration (µg/m³)	Value of change in annual average NO_2 and PM_{10}
Large (>4)	Greater than full MoU value of 10% of the air quality objective (4µg/m^3)
Medium (>2)	Greater than half of the MoU (2µg/m^3), but less than the full MoU (4µg/m^3) of 10% of the air quality objective
Small (>0.4)	More than 1% of objective (0.4µg/m^3) and less than half of the MoU i.e. 5% (2µg/m^3). The full MoU is 10% of the air quality objective (4µg/m^3)
Imperceptible (</= 0.4)	Less than or equal to 1% of objective (0.4µg/m^3)

Notes: MoU = Measure of Uncertainty (10% of the objective)

5.6.3 Only receptors which exceed the air quality objective (NO_2 annual mean of 40µg/m³) in either the Do Minimum or Do Something scenarios are used to inform significance. The total number of receptors in each magnitude band are then aggregated and compared to the guideline number of receptors constituting a significant effect as shown in Table 5.5. The guideline bands have been developed for each magnitude category, and set the upper level of likely non-significance and the lower level of likely significance. Between these 2 levels are the ranges where likely significance is more uncertain, and therefore professional judgment would be required.

Table 5.5: Guideline to number of properties constituting a significant effect

Magnitude of change in concentration (µg/m³)	Number of receptors with:	
	Worsening of air quality objective already above objective or creation of a new exceedance	Improvement of an air quality objective already above objective or the removal of an existing exceedance
Large (>4)	1 to 10	1 to 10
Medium (>2)	10 to 30	10 to 30
Small (>0.4)	30 to 60	30 to 60

5.6.4 If a scheme is above the lower level of likely significance, consideration should be given to all the evidence that may support or detract from the conclusion of a significant effect. The information compiled to complete Table 5.11 is then used along with the following key criteria to determine the overall evaluation of local air quality significance:

- Is there a risk that environmental standards will be breached?
- Will there be a large change in environmental conditions?
- Will the effect continue for a long time?
- Will many people be affected?
- Is there a risk that protected sites, areas, or features will be affected?
- Will it be difficult to avoid, or reduce, or repair, or compensate for the effect?

5.6.5 IAN 174/13 provides advice on how to determine the significance of effect significance in relation to each of the criteria above, and this advice has been used when determining the overall significance. However, not every receptor has been modelled in areas where exceedances of the annual mean NO_2 AQO may occur. This would be undertaken at the next stage of assessment and the findings will be presented within the ES. The results predicted at the most sensitive receptor locations (receptors closest to roads with the largest changes in traffic characteristics) have been used here to estimate how many receptors (with an exceedance) are likely to be affected by the scheme, in relation to the criteria shown in Table 5.10 and Table 5.11, and therefore whether there could potentially be a significant effect.

5.7 Consultation

5.7.1 Initial consultation with South Somerset District Council has been progressed through the key stakeholder engagement exercises which have been undertaken since project inception, as detailed within section 2.7 of this report.

5.7.2 Consultation with South Somerset District Council will be undertaken to inform the ES and to ascertain the most up-to-date ambient air quality monitoring data.

5.8 Assumptions and limitations

5.8.1 Air quality modelling predictions have been based on the most reasonable, robust and representative methodologies in accordance with best practice guidance. However, there is an inherent level of uncertainty associated with the Screening Method predictions which have been used in previous assessments, including:

- Uncertainties with traffic forecasts
- Uncertainties with vehicle emission predictions
- Uncertainties with background air quality data
- Simplifications made within Screening Method calculations or post processing of the data that represent chemical reactions

5.8.2 To best manage these uncertainties, the air quality Screening Method was evaluated using air quality measurements to verify outputs. The Screening Method verification process was undertaken in line with Defra guidance[41] to manage the uncertainties referred to above. It does this by comparing modelled and monitored pollutant concentrations and, if necessary, adjusting the Screening Method output to account for systematic bias. However, it should be noted that modelled results following verification can still contain an element of residual uncertainty, which in IAN 174/13 is referred to a Measure of Uncertainty (MoU).

5.8.3 Following the verification process for the scheme an overall Root Mean Square Error value of less than 10% of the mean annual air quality objective is

[41] Defra (2016) Part IV of the Environment Act 1995, Environment (Northern Ireland) Order 2002 Part III: Local Air Quality Management Technical Guidance (TG16), available online at http://laqm.defra.gov.uk/documents/LAQM-TG16-April-16-v1.pdf (last accessed August 2017).

achieved, which is considered robust according to Defra guidance. On this basis, the modelled results were considered appropriate to allow a robust professional judgement of significance to be determined. The model verification for the scheme in the previous assessment is presented in appendix B.1.

5.8.4 The assessment which will be undertaken for the ES will have similar assumptions and limitations, although full dispersion modelling will be used instead of Highways England's DMRB Screening tool. Nonetheless, model verification will be undertaken to limit uncertainties associated with using dispersion models.

5.9 Design and mitigation measures

Construction

5.9.1 To mitigate against construction dust effects at receptors (drawings contained within appendix B.3) the construction contractor shall carryout construction works in accordance with the Best Practicable Means (BPM), as described in Section 79 (9) of the Environmental Protection Act 1990, to reduce emissions which may affect air quality. This could include, but not be limited to, the following mitigation measures that will be included within the Construction Environmental Management Plan (CEMP):

- Avoid double handling of materials
- Minimise height of stockpiles and profile to minimise wind-blown dust emissions and risk of pile collapse
- Locate stockpiles out of the wind (or cover, seed or fence) to minimise the potential for dust generation
- Ensure that all vehicles with open loads of potential dusty materials are securely sheeted or enclosed
- Provide a means of removing mud and other debris from wheels and chassis of vehicles leaving the site. This may involve a simple coarse gravel running surface or jet wash, or in the case of a heavily used exit point, wheel washers
- Maintain a low speed limit on site to prevent the generation of dust by fast moving vehicles
- Damp down surfaces in dry conditions
- Water should be sprayed during cutting / grinding operations (i.e. cutting kerbs)
- All vehicle engines and plant motors shall be switched off when not in use

Operation

5.9.2 No operational air quality specific mitigation measures have been designed into the scheme, and it is not likely that any operational mitigation would be incorporated into the design, on the basis that no likely significant effects have been identified to date. Further information on the likely significance of effects is contained within section 5.10.

5.10 Assessment of effects

5.10.1 Effects have been predicted at a selection of worst-case receptors which are within 200m of the Local ARN for the scheme. This section presents results from a previous assessment which was undertaken to inform option selection at receptors where the highest NO_2 concentrations and greatest effects are predicted (see Section 5.8 for the for differences between the previous and current assessments). Based on IAN 174/13, effects were only likely to be considered significant where AQOs are exceeded.

Construction

Human health and wellbeing effects

5.10.2 The construction phase is expected to last approximately 2.5 years and could affect local air quality through the generation and subsequent deposition of construction dust arising from construction activities and vehicle movements. A construction assessment was undertaken in accordance with DMRB HA207/07, which involves identifying sensitive receptors within 200m of the construction site. The drawing contained in Appendix B.8 shows the sensitive receptors identified for the construction phase. The plan contained within appendix A.2 provides an indication of the likely construction areas required for the scheme. However, at this stage, it is not known exactly where the site compound would be located and therefore only the construction boundary associated with the scheme alignment in relation to sensitive receptors was considered.

5.10.3 With the implementation of the mitigation measures identified above, air quality impacts from the construction phase of the scheme are not expected to be significant.

Operation

Human health and wellbeing effects

5.10.4 Predicted NO_2 concentrations at key receptors are presented in Table 5.6.

5.10.5 The highest predicted annual mean NO_2 concentrations occurred at receptor 7, which is on the existing A303 near Stoke Sub Hamdon, to the west of the scheme. Predicted annual mean NO_2 concentrations increased by 0.7µg/m^3 from 22.8µg/m^3 in the Do Minimum scenario to 23.5µg/m^3 in the Do Something scenario. Receptor 7 is located within 23m of the existing A303 (which has approximately 39,000 vehicles per day in the Do Minimum Scenario). At this location, total vehicle flows as a result of the scheme would increase by approximately 2,000 vehicles per day.

5.10.6 The greatest increase in annual mean NO_2 predicted at receptor 4 and receptor 9, where increases of 1.1µg/m^3 were predicted due to the scheme. Receptor 4 is located approximately 63m from a section of the A303 which would have approximately 28,400 vehicles per day on it in the Do-Minimum scenario. In the Do Something scenario, this receptor would be located approximately 38m from the new A303 alignment, which would have approximately 32,500 vehicles per

day. Receptor 9 meanwhile is located approximately 183m from a section of the A303 with 28,000 vehicles in the Do Minimum scenario and would be located approximately 84m from a section of the A303 which would have 32,000 vehicles in the Do Something scenario.

5.10.7 The greatest reductions in predicted annual mean NO_2 concentrations occurred at receptors 1 and 2, where a decrease of 7.3µg/m^3 and 6.9µg/m^3 respectively was predicted. Receptors 1 and 2 are both located within 10m of a section of the existing A303 which has approximately 28,000 vehicles per day in the Do Minimum Scenario. In the Do -Something Scenario, the new A303 alignment would have approximately 32,500 vehicles per day, but the scheme would move the A303 approximately 20m and 70m further from receptors 1 and 2 respectively.

5.10.8 All predicted annual mean concentrations of NO_2 were well below 60µg/m^3 and therefore no exceedances of the 1-hour NO_2 objective were predicted for the scheme. As such, an overall Not Significant Adverse effect was allocated.

Table 5.6: Annual mean NO_2 concentrations

No.	Location	NO_2 annual mean concentration (µg/m^3)			
		2015 Base Year	2023 DM	2023 DS	Change (DM to DS)
1	The Hollies (Plowage Lane/A303)	23.0	18.5	11.2	-7.3
2	Crusty Cottage (A303)	24.8	20.4	13.5	-6.9
3	The Firs (Steart Road/A303)	14.4	11.1	11.1	0.0
4	Pepperhill Cottage (Camel Hill)	12.1	9.4	10.5	1.1
5	Downhead Lane	7.7	5.7	5.7	0.0
6	Spring Lodge (A303)	17.1	13.9	14.3	0.4
7	Halfway House (A303)	27.9	22.8	23.5	0.7
8	Fosse Way	14.4	11.4	11.5	0.1
9	Plowage Lane	9.8	7.4	8.5	1.1
10	Hill View (A359)	12.2	9.4	9.2	-0.2
11	Vale Farm (Camel Hill)	7.4	5.5	5.5	0.0

Ecological effects

5.10.9 Concentrations of NO_X were predicted along 4 receptor transects at 10 metre intervals up to 200 metres maximum of from the scheme ARN centreline within the Whitesheet Hill, Stockton Wood and Down, Yarnbury Castle and Parsonage Down Designated sites, as presented in the drawing contained within Appendix B.5. As indicated in Table 5.7, annual mean NO_X concentrations at receptor E1 (Stockton Wood and Down) were predicted to exceed the critical level of 30µg/m^3 at the closest point to the road. The change in NO_x at this location was predicted to be 0.98µg/m^3, which is considered 'small' in accordance with IAN 174/13. This suggests that there is potential for a significant effect to occur at this site.

5.10.10 The exceedance of the NO_x critical level only affected a small area of the Stockton and Wood and Down Designated site; concentrations of NO_x were predicted to be below 30 µg/m^3 beyond approximately 5 metres into the SSSI away from the road. Further assessment detail is provided within Chapter 8

Biodiversity. More detailed assessment will also be undertaken for the ES to assess the potential changes in nitrogen deposition at the Stockton Wood and Down Designated site to determine the overall significance of effect of the scheme in accordance with IAN 174/13.

5.10.11 Predicted NOx concentrations at the remaining ecological receptor locations were below 30µg/m^3 and changes were imperceptible. Therefore, ecological receptors E2, E3 and E4 (Whitesheet Hill, Yarnbury Castle and Parson Down) were not considered further.

Table 5.7: Annual mean NOx concentrations at ecological receptors

Receptor ID	Distance to the scheme ARN centreline (m)	Annual mean NO_x concentration (µg/m^3)		
		2023 DM	2023 DS	Change (DM to DS)
E1 (Stockton Wood and Down)	9.5*	30.9	31.9	0.98
	14.5	22.3	22.9	0.60
	19.5	18.7	19.1	0.44
	29.5	15.3	15.6	0.30
	39.5	13.6	13.8	0.23
	49.5	12.6	12.8	0.19
E2 (Whitesheet Hill)	151.5	9.1	9.1	0.09
E3 (Yarnbury Castle)	83	10.7	10.8	0.11
E4 (Parsonage Down)	196	9.5	9.5	0.04

Note: change in NO_x presented to 2dp to indicate magnitude of change and is not an indication of model accuracy.
*Distance of 9.5 metres from the scheme ARN centreline equivalent to 5 metres from the edge of the road.

Assessment of significance

5.10.12 No exceedances of air quality objectives were predicted at human receptors in the Do Minimum and Do Something scenario, and therefore effects are not expected to be significant in accordance with IAN 174/13.

5.10.13 As discussed in section 5.3.40, the scheme is expected to have a low compliance risk rating and is therefore unlikely to cause non-compliance with EU Directive 2008/50/EC.

5.10.14 There was a small increase in NO_x concentrations at the boundary of the Stockton Wood and Down SSSI (E1), which was predicted to be exceeding the NO_x annual objective in the Opening Year Do-Minimum and Do Something scenarios. More detailed assessment will be undertaken for the ES for this designated site to assess whether the predicted changes in NO_x concentrations and nitrogen deposition are significant.

Regional effects

5.10.15 Results from the regional assessment are presented in Table 5.8. The scheme is predicted to cause an increase in emissions of NO_X, PM_{10} and CO_2 in the Opening and Design Year. This is due to an increase in the number of vehicles travelling along the A303 in the Do Something scenario relative to the Do Minimum scenario.

Table 5.8: Regional effects

Pollutant	2023			2038		
	DM	DS	Change (DM to DS)	DM	DS	Change (DM to DS)
NOx (kg/yr)	45,397	49,706	4,309	87,544	95,804	8,260
PM_{10} (kg/yr)	6,009	6,408	399	14,951	16,077	1,126
CO_2 (tn/yr)	37,832	40,908	3,077	94,886	102,652	7,765

5.11 Monitoring requirements for significant adverse effects

5.11.1 As no significant adverse effects on human receptors are anticipated, no operational air quality monitoring is required for the scheme. Further work will be undertaken for the ES to determine the likelihood of a significant effect at Stockton Wood and Downs SSSI. Any requirements for monitoring of significant effects for Stockton Wood and Downs SSSI will subsequently be established as part of this more detailed assessment, and reported within the ES. At this stage, it is not considered that further monitoring will be required.

5.12 Conclusions

5.12.1 This chapter provides a summary of the assessments that have been undertaken so far of the potential air quality effects of the scheme in accordance with DMRB Volume 11 Section 3, Part 1 – Air Quality (HA207/07) and relevant IANs.

5.12.2 Some construction activities would be likely to generate dust, which has the potential to cause annoyance (e.g. discolouration of surfaces) at nearby properties if uncontrolled. These effects would be mitigated through the implementation of best practicable means included as part of the CEMP.

5.12.3 Operational air quality effects have been predicted at worst-case receptors using the DMRB Screening Method. In the ES, effects will be predicted using the ADMS-roads dispersion model.

5.12.4 The operational local air quality effects can be summarised as:

- There is a low risk that the scheme 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 the EU Directive. The overall effects to human health and wellbeing are anticipated to be Not Significant Adverse, during both construction and operation

- There is a potential risk of a Significant Adverse effect at the Stockton Wood and Down SSSI during operation, from the scheme. Therefore, more detailed assessment will be undertaken for this designated site to assess the potential changes in nitrogen deposition, and will be reported within the ES

5.12.5 The scheme is predicted to cause small changes in regional emissions during operation, although the effects have been assigned as being Not Significant Adverse.

6 Cultural heritage

6.1 Introduction

6.1.1 This chapter presents the on-going work for the assessment of the potential effects upon the cultural heritage resource that are anticipated from the scheme and outlines proposed measures to help mitigate these potential effects.

6.1.2 The assessment is undertaken in accordance with the DMRB Volume 11, Section 3, Part 2 'Cultural Heritage'. Further detailed assessment is currently under way, and will be reported within the Environmental Statement (ES) that will be submitted to support the Development Consent Order (DCO) application.

6.2 Legislation and policy context

National legislation

6.2.1 The overarching legislation in relation to the historic environment in the UK is provided by:

- The Ancient Monuments and Archaeological Areas Act 1979
- The Planning (Listed Buildings and Conservation Areas) Act 1990

National policy

National Policy Statement for National Networks

6.2.2 The National Policy Statement for National Networks[42] (NPSNN) includes Section 5 'The Historic Environment' which addresses impacts to heritage assets and the conservation and enhancement of the historic environment. The statement sets out requirements for the applicant's assessment and the Secretary of State's responsibilities when dealing with planning proposals which have the potential to impact on cultural heritage assets.

6.2.3 Paragraphs 5.122 and 5.127 concern setting. Paragraph 5.122 states that heritage value is not just derived from the physical presence of the asset but also from its setting.

6.2.4 Paragraphs 5.123 to 5.1225 notes that the Secretary of State should not just consider designated assets in their assessment, but also non-designated assets.

6.2.5 Paragraph 5.131 notes that when considering the impact of a proposed development on the significance of a designated heritage asset, the SoS should give great weight to the asset's conservation. Paragraph 5.132 goes on to say

[42] 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 August 2017).

any harmful impact on the significance of a designated heritage asset should be weighed against the public benefit of development.

6.2.6 Paragraph 5.139 notes that a documentary record of our past is not as valuable as retaining the heritage asset and therefore the ability to record evidence of the asset should not be a factor in deciding whether consent should be given.

6.3 Assessment methodology

6.3.1 The assessment methodology for defining the significance of effects upon cultural heritage is contained within section 7.11 of the Environmental Impact Assessment (EIA) Scoping Report submitted to the Planning Inspectorate in November 2017. The Scoping Report can be accessed here:

6.3.2 https://infrastructure.planninginspectorate.gov.uk/projects/south-west/a303-sparkford-to-ilchester/?ipcsection=docs.

6.4 Study area

6.4.1 The cultural heritage assessment is based on a 1 kilometre study area. The study area has been developed in consultation with Historic England, South West Heritage Trust and the South Somerset District Council Conservation Officer. This allows a full understanding of the context and setting of the heritage assets identified; facilitating an assessment of the potential effects of the scheme during construction and operation upon heritage assets. The extent of the study area is based upon the guidance provided in DMRB Volume 11, Section 3, part 2, though the 1 kilometre area is larger than that advised in order to include effects on setting from the erection of new structures.

6.5 Existing baseline

Topography and geology

6.5.1 The A303 between the villages of Sparkford and Podimore climbs over Camel Hill before descending to the south-west into the Yeo Valley; an upland area between the rivers Carey and Yeo on the southern fringe of the Somerset Levels.

6.5.2 Sparkford, at the eastern end of the scheme, lies at approximately 46m AOD. Podimore, at the western end of the scheme, lies at approximately 19m AOD. Camel Hill rises to a height of approximately 68m AOD.

6.5.3 The underlying bedrock across the study area comprises of Jurassic and Triassic mudstones (Blue Lias formation and Charmouth Mudstone formation). Quaternary river gravel deposits (undifferentiated) are recorded as the superficial deposits[43].

[43] British Geological Society (BGS) (2016). *Geology of Britain viewer* [online] available at: http://mapapps.bgs.ac.uk/geologyofbritain/home.html (last accessed July 2017).

Archaeological and historical background

6.5.4 A full description of the archaeological and historical background will be provided within the Environmental Statement (ES), and a summary is provided below.

Designated Assets

6.5.5 There are 2 Scheduled Monuments located within the study area:

- Romano-British settlement immediately south-west of Camel Hill Farm (list entry ID 1020936), situated adjacent to the A303.
- Medieval settlement remains north of Downhead Manor Farm (list entry ID 1021260) approximately 400 metres to the north-north-west of the scheme.

6.5.6 There are 90 Listed Buildings within 1 kilometre of the scheme, comprising:

- 3 Grade I Listed Buildings, all churches, the closest of which is the Church of St Peter (NHLE 1295400), Podimore, 170 metres south of the scheme
- 6 Grade II* Listed buildings, the closest of which is the Triumphal arch gateway to Hazlegrove House (NHLE 1272919), 110 metres east of the eastern end of the proposed scheme
- 81 Grade II Listed Buildings, including Hazlegrove House and the formal garden wing walls and gateway (NHLE1277545, NHLE1248865), and one 19th century milestone (NHLE1345996) which is in the line of the scheme. The majority of the remaining 80 Listed Buildings are situated within historic settlements, away from the scheme

6.5.7 The settings of these listed structures need to be taken into account. At this early stage in the assessment process, while the design and location of some elements of the scheme (such as balancing ponds and construction compounds) remain unknown; it is necessary to base this assessment of setting impacts upon generalised assumptions. Proximity to the scheme is the main consideration in this context. As noted at the start of section 6.10, below, further stages of research, survey, and evaluation are to follow as part of the on-going assessment process (in tandem with the evolving scheme design) and therefore it is possible that the assessment of setting effects within section 6.10 will be revised.

6.5.8 The scheme would pass through the southern end of Hazlegrove House (Grade II Listed) Registered Park and Garden (list entry ID 1000422, Historic Environment Record (HER) 54430). This originated as a medieval deer park, which was altered during the 18th century to include an altered driveway / approach through the parkland to the south. This included the addition of the Triumphal Arch gateway at Sparkford. This was severed from the bulk of the parkland by the construction of the 1990s Sparkford Bypass, which necessitated a further alteration of the driveway approaching the house.

6.5.9 The proposed new A303 dual-carriageway and junction (and roads leading to it) would require land take of approximately one third of the area of the designated parkland for the scheme. This would be at the southern end of the parkland; an

area currently comprising 1 substantial arable field (approximately 50% of this area), an area of woodland, and open parkland used for grazing cattle. The arable area was historically part of the parkland of the Hazlegrove estate. The current entrance and driveway to the school also leads through this area from the Sparkford Roundabout.

6.5.10 There are 2 Conservation Areas located within the study area; West Camel Conservation Area and Queen Camel Conservation Area, both on the southern flank of Camel Hill. They lie approximately 575 meters and 650 metres respectively from the scheme.

6.5.11 South Somerset District Council has highlighted an area of high archaeological potential for prehistoric and Romano-British settlement remains in the vicinity, as demonstrated by evidence from aerial photographs, as well as subsequent archaeological survey and investigation undertaken over the last 20 years.

6.5.12 The archaeological aerial survey identified traces of several possible funerary monuments in the area of the Camel Hill Services. The most likely of these is a possible Bronze Age round barrow in the field opposite the filling station. This lies directly in the line of the scheme. Previous geophysical survey in the south-eastern part of this field identified traces of what were thought to be 3 further possible barrow sites, although subsequent trial trenching yielded negative results (HER 11600, 11604). Several further ring ditch cropmarks are visible approximately 190 metres to the north-west, on the western side of Pepper Hill Copse (approximately 110 metres from the scheme). The former quarry now occupied by the Camel Hill Services is the site of a known early medieval cemetery site (see below) and it is likely that this prominent hilltop location provided an optimum setting for burial from the prehistoric period onwards due to its high visibility within the surrounding landscape.

6.5.13 An area of Iron Age settlement to the south-west of Camel Hill Farm (HER 11595) has been identified through geophysical survey and trial trenching on both sides of the A303. The proposed new side-road on the south-eastern side of Camel Hill Farm would lie immediately adjacent to this area. The aerial survey and transcription undertaken as part of the Historic Environment Appraisal identified slight traces of former boundary banks which may be associated with this on the southern side of the A303. The scheme would pass through this area.

6.5.14 Multiple sites of Iron Age settlement and findspots have been recorded across the study area, including a settlement to the south-east of Podimore (HER 54794), approximately 115 metres to the south of the western end of the scheme.

6.5.15 Between the A303 and Camel Hill Farm, a large square banked enclosure was visible on vertical aerial photographs of 1947. The bank was approximately 2 metres wide, and enclosed an area measuring 30 metres by 26 metres. Its proximity to both the areas of prehistoric and Romano-British settlement to the west, as well as the early medieval cemetery to the south (see paragraph 6.5.26 below) raises the possibility of an association with one of these. Alternatively, it may have had an origin related to the nearby historic and modern limestone

quarrying and processing. In addition to the Scheduled Monument noted in section 6.5.5, the A303 roughly follows the course of the Roman road between Ilchester (Roman *Lindinis*) to the south-west, and Andover (the A303 roughly follows the same route).

6.5.16 An early medieval inhumation cemetery is known at the former quarry site which is now partially occupied by the Camel Hill Services (between the A303 and Gason Lane) (HER 54429).

6.5.17 Areas of abandoned medieval and post-medieval settlement at Podimore extend beyond the limits of the current village, especially to the north and south (HER 54802). Evidence of this was mapped during the aerial survey from earthworks visible on lidar in the field on the western side of Higher Farm Lane, on the northern side of the A303. This is near to the western termination of the scheme.

6.5.18 Extensive areas of medieval (and possibly also post-medieval) ridge and furrow, as well as former field boundaries, are clearly visible across the study area on aerial photographs and lidar.

6.5.19 By far the most frequent evidence of activity dating to the post-medieval period from across the study area are the extensive former quarry sites. Limestone was extracted from sites across the ridge that forms Camel Hill, to be converted to lime for use in the building trades, as well as in agriculture. This was done in the numerous small limekilns that existed previously across the Camel Hill area. The closest historic quarry and limekiln sites to the scheme are:

- An area to the west of Camel Hill Farm, on the northern side of the A303. A small roadside portion of this area has subsequently been re-opened as a modern quarry. The scheme would run alongside the southern edge of this area
- The area between Camel Hill Farm and Pepper Hill Cottage, on the northern side of the A303. These areas would be partially overlapped by the scheme
- The quarry site at Ridge Copse (HER 24645), on the southern side of the A303. This site included a limekiln at its southern extent (HER 54442). The scheme would run alongside the northern edge of this area

6.5.20 Royal Naval Air Station (RNAS) Yeovilton, which dates from WWII (HER 55405), lies to the south of the western end of the scheme. Its northernmost extent lies just to the south of the current A303. The scheme would partially overlap the northern extent of a former Royal Observer Corp (ROC) radar station HER 56969, on the south-eastern side of the junction of the A303 with Traits Lane.

6.5.21 Further possible nearby WWII related sites and features identified by the aerial survey include:

- 11 rows of rectangular temporary structures visible on vertical aerial photographs of 1943 and 1944 alongside the A303 and B3151 roads (towards the western end of the scheme). These have been interpreted

as temporary storage or accommodation associated with RNAS Yeovilton during the war

- 2 possible bomb craters visible within the triangular area of land between the A303 and the B3151 (at the western end of the scheme)
- 4 possible air raid shelters or bunkers visible on vertical aerial photographs of 1947 and 1960 as oblong mounds in the field on the south-eastern side of Conegore Corner. Though they appear to have been levelled by the time of the 2009 lidar imagery; it is possible that sub-surface features may remain. The scheme would encompass the northernmost two of these features

6.6 Value (sensitivity of resources and receptors)

6.6.1 The value / sensitivity of the known heritage assets along the scheme is discussed below, and is also itemised in the impact assessment tables in section 6.10.

6.6.2 Many of the non-designated archaeological remains anticipated as being present on Camel Hill along the scheme would be considered as receptors of medium or high value / sensitivity (heritage significance). This includes the area of Iron Age and Roman period settlement to the south-west of Camel Hill Farm (the scheduled area is of high value / sensitivity), as well as the possible prehistoric funerary monuments near the Camel Hill Services. The early medieval cemetery at this location is thought to have been partially removed by historic limestone quarrying. However, any parts of it that remain (the HER records it as extending beyond the former quarry site) would be of potentially medium value / sensitivity (depending on the nature of any surviving features, and level of preservation of the remains).

6.6.3 Heritage assets of medium value / sensitivity may be encountered in the area of High Archaeological Potential identified by South Somerset District Council at the western end of the scheme. These may be prehistoric and Romano-British settlement remains.

6.6.4 The medieval and post-medieval Hazlegrove House (Grade II Listed) Registered Park and Garden is of medium value / sensitivity. The grade II listed Hazlegrove House Registered Park and Garden wing walls and gateway are also assets of medium value. The Grade II* Triumphal Arch is an asset of high value.

6.6.5 Areas of abandoned medieval settlement, medieval and post-medieval ridge and furrow and the former limestone quarry and kiln sites near to the scheme are likely to be of low value / sensitivity. However, the condition of these possible sub-surface remains has not previously been ascertained through archaeological investigation, and therefore the assessment of their value / sensitivity is tentative.

6.6.6 The 2 former WWII Royal Observer Corp sites on Camel Hill, as well as the remainder of the possible nearby WWII related sites and features identified are of low and negligible heritage value / sensitivity. The sites of former such structures are of negligible value / sensitivity.

6.6.7 Listed buildings are not expected to be physically affected (except for a Grade II Listed milestone adjacent in line of the scheme; medium value / sensitivity). They are however sensitive receptors, and their settings will need to be taken into consideration during the design process. The majority of Listed Buildings in proximity to the route will already have had their settings compromised by the existing road. In the majority of cases this is through increased noise intrusion and the visual erosion of their historic rural setting.

6.7 Consultation

6.7.1 Consultation has been carried out with Historic England and the South West Heritage Trust (SWHT) as part of the key stakeholder engagement exercises, as detailed within section 2.7 of this report. Additional consultation focused specifically on the Registered Park and Garden is currently taking place with the following heritage stakeholders:

- South Somerset District Council Conservation Officer
- South Somerset District Council Landscape Architect
- The Gardens Trust (formerly The Garden History Society, statutory consultee for Registered Parks and Gardens[44,45])
- Historic England Inspector of Ancient Monuments
- Historic England 'Heritage at Risk' Landscape Architect
- SWHT (Archaeological Advisors to the Local Planning Authority)

6.7.2 The stakeholders were provided with the scheme information via the public consultation website[46], and were invited to a meeting on-site at Hazlegrove House (Grade II Listed) Registered Park and Garden on 15 March 2017. The Gardens Trust was to be represented at this meeting by a member of the Somerset Gardens Trust, but unfortunately they were unable to attend at short notice. The SWHT consultees chose not to attend this meeting, as it was focussed on the registered park and garden itself. This meeting was a preliminary discussion ahead of the non-statutory public consultation phase on this scheme.

6.7.3 The Historic England response to the non-statutory public consultation (dated 29 March 2017, reference PL00069502) can be summarised as follows:

- There is the potential for remains associated with the Scheduled Romano-British settlement at Camel Hill Farm (list entry ID 1020936, on the northern side of the A303) to be encountered on the southern side of the A303. This is in the path of the scheme. If identified during archaeological evaluation, such remains may be of equal significance to the Scheduled remains.

[44] Historic England (2017) *Park & Garden Registration FAQs*. https://historicengland.org.uk/listing/what-is-designation/registered-parks-and-gardens/pag-faqs/ Accessed 1/3/2017.
[45] The Gardens Trust (2017) *About us*. http://thegardenstrust.org/about-us/ Accessed 1/3/2017.
[46] Highways England (2017) *A303 Sparkford to Ilchester: Overview* [online] available at: https://highwaysengland.citizenspace.com/he/a303-sparkford-to-ilchester/ (last accessed July 2017).

- Historic England notes that the scheme would lead to physical effects to approximately 30% of the Hazlegrove House (Grade II Listed) Registered Park and Garden (Grade II, list entry ID 1000422).
  - Historic England recommended that as the potential harm to this asset is so great; the highest level of detail of research will be required to fully understand its significance.
  - Historic England also noted that within Highways England's Heritage Impact Assessment; the scheme should then be tested against the significance of this heritage asset. A preference was stated for this assessment to take the form of a simple narrative, supported by illustrations (rather than purely in the form of a matrix deriving from EIA methodology).
  - Historic England recommended that mitigation of the effects of the proposals on the registered park and garden should include as an initial step a Conservation Management Plan (CMP). This should *"…consider how best to conserve (what remains of) the park, and retain its significance"*.
  - It was noted that as the direct effects on the registered park and garden would constitute, in Historic England's view, substantial loss; it will therefore be necessary to demonstrate substantial public benefits that outweigh that harm or loss. This is in accordance with paragraph 133 of the National Planning Policy Framework (NPPF). This should include an explanation of how such benefits might be delivered to the surviving portion of the registered park and garden.

6.7.4 Following the meeting at Hazlegrove House (Grade II Listed) Registered Park and Garden on 15 March 2017, South Somerset District Council issued a summary of its consultees' responses in an email (from the South Somerset District Council Landscape Architect, dated 21 March 2017). This can be summarised as follows:

- It is considered that the effect on the Registered Park and Garden will be substantial, and that the integrity of the park will be compromised. Although the immediate effect would be on the southern third of the park; the effects also extend across the remainder of the park.
- The current negative effect of the Camel Hill service station on the setting of Hazlegrove House itself is noted, and therefore the opportunity for potential scheme enhancement measures to improve this by reducing the visual profile of the service station.
- Parts of the scheme will lie out of sight from the house and its immediate surroundings, concealed from that viewpoint within the dip to the south of the plateau on which the house sits. However, there is the potential for the heads of lighting columns to protrude above this point, and therefore the possibility of light spill as a possible effect on setting. It is noted that *"mitigation options such as planting and ground modelling will be essential if the landscape and visual effects of the new roads are to be suitably contained"*.
- The historic connection to Hazlegrove Lodge and to Sparkford were severed by previous road modifications (the 1990s Sparkford Bypass), resulting in access to the park from Sparkford Roundabout, instead of

directly from Sparkford itself. The scheme is likely to further change this, with access to the park subsequently likely to be from a new roundabout on the northern side of the new dual-carriageway. They consider this to be a potential substantive adverse effect, which will be difficult to mitigate for either proposed route option.

- The potential effect of the proposed works (including the new dual-carriageway as well as a new roundabout) on the southern third of the park is substantial and harmful.
- Although mitigation options were discussed, South Somerset District Council is unable to support the scheme at this stage due to the likely adverse effects on the historic landscape of the Registered Park and Garden. An alternative design is suggested, disposing of the need for the new roundabout on the northern side of the dual-carriageway. This would retain the Hazlegrove access as a *"separate, distinct entity, as close to its current alignment as is feasible, to thus reduce the level of impact upon the registered park"*.

6.7.5 These suggestions have subsequently been discussed at length between the South Somerset District Council consultees and the design team. Discussions will continue as the design evolves following the statutory public consultation.

6.8 Assumptions and limitations

6.8.1 The site visits undertaken to date have been restricted to external visual inspection from publicly assessable areas only.

6.8.2 Non-intrusive geophysical surveys were progressed during December 2017 and January 2018. The geophysical survey results are therefore not yet available. Depending on the results of these geophysical surveys, a series of intrusive surveys such as trial trenching may be required as part of the scheme. In the absence of these intrusive and non-intrusive surveys, the archaeological potential along the scheme cannot be considered to have been fully examined or determined yet.

6.8.3 Information provided by HERs can be limited because it depends on random opportunities for research, fieldwork, and discovery. Where nothing of historic interest is shown in a particular area, this can be down to a lack of targeted research or investigation rather than the genuine absence of sub-surface archaeological deposits.

6.8.4 Documentary sources are rare before the medieval period, and many historic documents are inherently biased. Older primary sources often fail to accurately locate sites and interpretation can be subjective.

6.8.5 Where archaeological sites have been identified solely from aerial imagery without confirmation from archaeological excavation or supporting evidence in the form of, for example, findspots, it is possible the interpretation may be revised in the light of further investigation. It should be noted that the absence of indications of archaeological features on aerial imagery does not confirm an absence of sub-surface archaeological deposits, as visibility from the air is dependent upon a complex combination of factors. These include:

- Unsuitable conditions at the time of image capture (such as lighting, ground moisture content and crops or other ground cover)
- Variable quality of photography
- Variable type of photography, i.e. purpose-flown oblique imagery taken for archaeological purposes or 'blanket' vertical aerial photography which is usually at a much smaller scale
- Underlying features being masked by alluvial build-up

6.8.6 Conclusions and recommendations may therefore be revised during the production of the ES, on the basis of updated information following further research, survey, and investigation.

6.9 Design and mitigation measures

Construction

6.9.1 The scheme would be likely to adversely affect designated and non-designated heritage assets during construction.

6.9.2 The close proximity of Scheduled Monuments and Listed Buildings to the scheme presents the potential for significant effects upon the setting of heritage assets. The scheduled monument of the Romano-British settlement immediately south-west of Camel Hill Farm is situated on the northern side of the A303; alterations to the road have the potential for a significant adverse effect upon the setting of the asset. There is also the adverse physical effect on the Hazlegrove House Grade (Grade II Listed) Registered Park and Garden which is likely to be significant, and additionally, the potential for significant adverse effects on below-ground archaeological remains from the prehistoric period onwards. A Grade II Listed early 19th century milestone would also likely need to be relocated. Depending on the method of moving and chosen site of the relocated milestone, this has the potential to result in a Significant Adverse effect.

6.9.3 For Hazlegrove House (Grade II Listed) Registered Park and Garden mitigation measures will be determined based on a specific CMP. This will ensure that mitigation works are carried out in an informed manner to protect and enhance the special character of the asset as far practicable.

6.9.4 Where effects to heritage assets are unavoidable, mitigation would be included during the preliminary and detailed design and within the ES. For effects on setting, this may include planting, screening, noise attenuation and appropriate lighting, with the aim of reducing the effect on heritage assets in the vicinity. Effects (both physical and setting) may be mitigated through alteration of the scheme design, or elements of it, such as the placement of bunds, drainage, ponds, landscaping and planting. Preserving archaeological remains in-situ would be explored during the design process. Best practice measures to limit impacts on heritage assets would be employed during construction through the implementation of a Construction Environmental Management Plan (CEMP).

Operation

6.9.5 Below-ground archaeological deposits would not be affected by the operation of the new dual-carriageway. However, the presence of faster moving traffic than previously would affect to a varying degree on the setting of some heritage assets. These would include Listed Buildings / structures in close proximity to the scheme, as well as the Hazlegrove House (Grade II Listed) Registered Park and Garden.

6.9.6 However, there are also opportunities for enhancement measures to improve the setting of these and other designated heritage assets, such as from the positive effect of screening vegetation. As noted above, measures such as the placement of bunds, noise attenuation screening and appropriate lighting would also contribute to both mitigation of the proposed changes, as well as the improvement of the current setting of designated heritage assets (see Section 6.11 Enhancement measures below).

6.10 Assessment of effects

6.10.1 The assessment of effects set out below is based on what is known of the heritage assets from research undertaken to date. This has identified key heritage assets from the HER and NHLE datasets (as well as the aerial survey results) likely to be affected by the scheme. The assessment of the value/ sensitivity of the heritage assets identified to date (section 6.6) may therefore be revised in the light of this further work. Additional heritage assets may also be identified during this process.

6.10.2 In accordance with DMRB guidance, effects with an assessment of moderate and above are considered to be significant.

Construction

6.10.3 The assessment of effects during construction is shown below in Table 6.1.

Table 6.1: Summary of the assessment of value, magnitude of impacts, and significance of effects upon key heritage assets (construction)

Asset	Description of impact	Sensitivity of asset	Magnitude of impact	Significance of effect
Camel Hill Farm prehistoric settlement (HER 11595)	Permanent adverse – total or partial removal of elements of the settlement on the southern side of the A303 during construction.	Medium	Moderate	Moderate
Possible round barrow(s) opposite Camel Hill Services	Permanent adverse – total removal of heritage asset(s) during construction.	Medium	Major	Moderate / Large
Possible square barrow to south of Gason Lane	Permanent adverse – possible removal of associated features in what may be a wider prehistoric funerary location.	Medium	Minor	Slight
Square banked enclosure between Camel Hill Farm and the A303	Permanent adverse – possible partial removal of the southern edge of this feature (though it's current survival is unknown).	Low	Moderate	Slight
Camel Hill Farm Romano-British settlement (HER	Permanent adverse – partial or total loss of any possible associated features on the	High	Moderate	Moderate / Large

Asset	Description of impact	Sensitivity of asset	Magnitude of impact	Significance of effect
11607, Scheduled, list entry ID 1020936)	southern side of the A303 during construction.			
Camel Hill Services early medieval cemetery (HER 54429)	Permanent adverse – partial or total loss of features at the edge of the cemetery (which is not defined with any certainty) during construction.	Medium	Moderate	Moderate
Podimore possible medieval settlement remains (HER 54802)	No direct impact.	Low	No change	Neutral
South Somerset District Council Area of High Archaeological Potential (likely prehistoric or Romano-British settlement remains)	Permanent adverse – possible minor loss of associated elements beyond the limits of the South Somerset District Council polygon. Setting unaltered.	Medium	Negligible	Neutral / Slight
Hazlegrove House (Grade II Listed) Registered Park and Garden (list entry ID 1000422)	Permanent adverse – 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. Temporary adverse – impact on setting from noise during construction, as well as the presence of large machinery, construction compounds, hoardings & workforce etc.	Medium	Major	Moderate / Large
Hazlegrove House (Grade II, list entry ID 1277545) Garden Gateway and Wing Walls (Grade II, list entry ID 1248865)	Permanent adverse – partial loss or alteration to their setting, which is key to the significance of these assets. Temporary adverse – impact on setting from noise during construction, as well as the presence of large machinery, construction compounds, hoardings & workforce etc.	Medium	Moderate	Moderate
Hazlegrove Triumphal Arch (Grade II*, list entry ID 1272919)	Permanent adverse – further alteration of setting (previously compromised by the 1990s bypass), which may slightly further impact its significance. Temporary adverse – impact on setting from noise during construction, as well as the presence of large machinery, construction compounds, hoardings & workforce etc.	High	Minor	Slight / Moderate
Ridge and furrow and former field boundaries	Permanent adverse – partial loss of some areas of ridge and furrow during construction.	Low	Moderate	Slight
Limestone quarries and limekilns	Permanent adverse – partial loss of some poorly preserved areas of former quarry pits, spoil heaps, or limestone processing.	Low	Minor	Neutral / Slight
Camel Hill WWII ROC station (south of A303) (HER 56969)	Permanent adverse – loss of up to 10m at the northern edge of the site (which doesn't include any above-ground structures).	Low	Minor	Neutral / Slight
Camel Hill WWII ROC station site (north of A303) (HER 15747)	No direct impact. No structures remaining to have setting impacted.	Negligible	No Change	Neutral
WWII former temporary storage / accommodation	No direct impact – these temporary structures were removed post-WWII. No known	Negligible	No Change	Neutral

Asset	Description of impact	Sensitivity of asset	Magnitude of impact	Significance of effect
structures near RNAS Yeovilton	sub-surface features at these sites.			
Possible air raid shelters / bunkers near Conegore Corner	Permanent adverse – partial destruction of 2 of these features during construction.	Low	Moderate	Slight
Petter-Nissen 'Round Houses' at Howell Hill (HER 50296-7)	Permanent adverse – upgraded road would be *c*.30m closer to the houses than at present, potentially impacting their setting to some degree (this is yet to be determined). Temporary adverse - impact on setting from noise during construction, as well as the presence of large machinery, construction compounds, hoardings & workforce etc.	Low	Moderate	Slight
A303 milestone (Grade II, list entry ID 1345996)	Permanent adverse physical impact – this asset lies directly on the line of the scheme. Would need to be relocated, perhaps to the northern side of the existing A303. It should retain its context next to the route it is intended to mark.	Medium	Minor	Slight
Eyewell House (Grade II, list entry ID 1039625) Range of outbuildings attached to north of Eyewell House (Grade II, list entry ID 1258875) East boundary wall and gateway c.15m east of Eyewell House (Grade II, list entry ID 1258884)	Permanent adverse slight impact upon setting – although the upgraded road would lie only c.7m closer than the current A303; the house and associated assets would lie c.30m to the SW of a proposed new side road cutting. This is a realignment of the existing Traits Lane into a cutting to pass under the new road. The upgraded A303 would sit on a slight embankment at this location, and may therefore make the road slightly more prominent within the rural setting of the property. Temporary adverse – impact on setting from noise during construction, as well as the presence of large machinery, construction compounds, hoardings & workforce etc.	Medium	Minor	Slight
Milestone on B3151 (Grade II, list entry ID 1056780)	Permanent impact - This asset would lie approximately 30m to the SW of the tie-in to the existing B3151 (which would follow the same alignment of the current lane, and would not be any wider). This alteration is unlikely to alter the setting of this heritage asset.	Medium	Negligible	Neutral/ Slight
The Roundhouse, Sparkford (Grade II, list entry ID 1272897)	Permanent impact - This building currently lies between High Street, Sparkford; and the Sparkford Bypass (dual-carriageway). It would be located approximately 200m from the easternmost end of the scheme; the point at which the new alignment of the A303 will merge with the Sparkford Bypass. This alteration is unlikely to alter the setting of this heritage asset. Temporary adverse – there is the potential for some slight impact on setting from noise during construction, as well as the	Medium	Negligible	Neutral/ Slight

Asset	Description of impact	Sensitivity of asset	Magnitude of impact	Significance of effect
	presence of large machinery, construction compounds, hoardings and workforce etc.			
Sparkford Inn (Grade II, list entry ID 1273205) Outbuilding c.5m NE of Sparkford Inn (Grade II, list entry ID 1243391)	Permanent impact - These buildings currently lie between High Street, Sparkford; and the Sparkford Bypass (dual-carriageway). They would be located c.185-200m from the easternmost end of the scheme; the point at which the new alignment of the A303 will merge with the Sparkford Bypass. This alteration is unlikely to alter the settings of these heritage assets. Temporary adverse – there is the potential for some slight impact on setting from noise during construction, as well as the presence of large machinery, construction compounds, hoardings & workforce etc.	Medium	Negligible	Neutral/ Slight

Operation

6.10.4 There will be no effects on sub-surface archaeological remains from the operation of the scheme. Any potential effects on these types of heritage assets will have taken place during the construction phase, and have been addressed in Table 6.1 above. As such they are not included in the assessment of operational effects in Table 6.2.

6.10.5 Table 6.2 below summarises the assessment of effects on key heritage assets during operation.

Table 6.2: Summary of the assessment of value, impacts, and effects upon key heritage assets (operation)

Asset	Description of impact	Sensitivity of asset	Magnitude of impact	Significance of effect
Hazlegrove House (Grade II Listed) Registered Park and Garden (list entry ID 1000422)	Adverse – impact on setting and significance due to the road passing through the southern third of the park. Road noise, as well as lighting from vehicles and lamp posts may therefore be slightly more noticeable throughout the remainder of the park and consequently slightly impact its setting.	Medium	Minor	Slight
Hazlegrove House (Grade II, list entry ID 1277545) Garden Gateway and Wing Walls (Grade II, list entry ID 1248865)	Adverse – impact on setting and significance due to the road passing closer to the house and gardens than previously – road noise, as well as lighting from vehicles and lamp posts may therefore be more noticeable and slightly impact their setting.	Medium	Minor	Slight
Hazlegrove Triumphal Arch (Grade II* listed, list entry ID 1272919)	No change – heavy traffic already passes adjacent to this area with the current arrangement of the A303, and there is already junction lighting in place adjacent to this asset.	High	No change	Neutral
Camel Hill WWII ROC station (south of A303) (HER 56969)	No change – heavy traffic already passes adjacent to this area with the current arrangement of the A303.	Low	No change	Neutral
Petter-Nissen 'Round Houses' at Howell Hill (HER 50296-7)	Adverse – impact on setting and significance due to the road passing closer to the houses than previously –	Low	Minor	Neutral / Slight

Asset	Description of impact	Sensitivity of asset	Magnitude of impact	Significance of effect
	road noise, as well as lighting from vehicles and lamp posts may therefore be more noticeable and slightly impact their setting.			
A303 milestone (Grade II, list entry ID 1345996)	Asset will have been either removed or relocated during construction. If relocated to the other side of the road, there will be no further impact from the adjacent passing of traffic.	Medium	No change	Neutral
Eyewell House (Grade II Listed, list entry ID 1039625) Range of outbuildings attached to north of Eyewell House (Grade II, list entry ID 1258875) East boundary wall and gateway c.15m east of Eyewell House (Grade II, list entry ID 1258884)	These assets are already located adjacent to Traits Lane, and c.190-200m to the south of the current A303. The operation of the altered alignment of Traits Lane, and the upgraded A303 is unlikely to produce any operational effects (in terms of noise, visible traffic) not already experienced at this location. One exception to this may be if lighting of the underpass leading to Camel Hill Farm were to be intervisible with Eyewell House at night as this would slightly diminish the rural setting of the property.	Medium	Minor	Slight
Milestone on B3151 (Grade II, list entry ID 1056780)	This asset would lie c.30m to the SW of the tie-in to the existing B3151 (which would follow the same alignment of the current lane, and would not be any wider). There are unlikely to be any operational differences to the current arrangement that would alter the setting of this heritage asset.	Medium	No change	Neutral
The Roundhouse, Sparkford (Grade II, list entry ID 1272897)	This building would not be located any closer to a dual-carriageway than it is currently. There are unlikely to be any operational differences to the current arrangement that would alter the setting of this heritage asset.	Medium	No change	Neutral
Sparkford Inn (Grade II, list entry ID 1273205) Outbuilding c.5m NE of Sparkford Inn (Grade II, list entry ID 1243391)	These buildings would not be located any closer to a dual-carriageway than they are currently. There are unlikely to be any operational differences to the current arrangement that would alter the setting of these heritage assets.	Medium	No change	Neutral

6.11 Enhancement measures

6.11.1 It is considered that the existing A303 (and associated features such as the Camel Hill services, and the lighting / signage around the current Sparkford roundabout) currently has a negative effect on the setting of the Hazlegrove House (Grade II Listed) Registered Park and Garden. Although the scheme would require substantial additional land take within the southern third of the park, it is possible that some enhancement to the setting may be gained through design measures that could introduce screening of both the new road and the Camel Hill services.

6.11.2 This would be achieved through placing the route in a false cutting as it climbs Camel Hill. Trees planted on cuttings would better screen Camel Hill services from view from the park, as well as from Hazlegrove House (Grade II Listed) Registered Park and Garden. Such planting will be in keeping with the types of trees currently within the park, as well as in the nearby Ridge Copse and

Pepper Hill Copse. The possibility of screening the Camel Hill services from the park may also be explored through additional tree planting in the land parcel immediately to the west of the park (opposite the services). Additional measures to enhance the setting of the park, house, and gardens may include limited or absent junction lighting; and lower height and alternative colour lighting columns and signage columns.

6.11.3 As with mitigation measures introduced for Hazlegrove House (Grade II Listed) Registered Park and Garden, enhancement measured will be determined based on a specific CMP. This will ensure that any enhancements are carried out in an informed manner to project and enhance the special character of the asset.

6.11.4 Enhancement measures have not so far been explored for other heritage assets along the route; these will be explored as part of on-going assessment work and details will be included within the ES.

6.12 Monitoring requirements for significant adverse effects

6.12.1 A CMP for Hazlegrove House (Grade II Listed) Registered Park and Garden will be prepared in conjunction with other related disciplines, including landscape and nature conservation, to ensure integration across disciplines. This will focus on the monitoring and management of any historic environment mitigation work undertaken, such as visual screening and restoration and conservation of historic landscape and planting. Monitoring of vegetation establishment during the aftercare period will ensure successful mitigation of significant adverse effects. In the event of plant failure, action can be taken during the monitoring to rectify failures and ensure mitigation measures come to fruition. The CMP will also establish principles to ensure that any management of mitigation areas is completed in a way which is sympathetic to the character and significance of the Registered Park and Garden.

6.13 Conclusions

6.13.1 Previous archaeological survey and investigation, as well as the archaeological aerial survey and appraisal undertaken, has demonstrated that there is a high potential for multi-period archaeological remains spanning the prehistoric period to WWII within the study area. In addition to sub-surface archaeological features; there is the setting of multiple Listed Buildings and the physical effects on Hazlegrove House (Grade II Listed) Registered Park and Garden and an early 19th century milestone to consider. The potential for encountering or affecting the different heritage assets varies significantly between different locations within the study area.

6.13.2 During construction, the overall significance of effects on designated heritage assets would be Moderate / Large Adverse. During operation, this would be Slight Adverse for designated heritage assets. The overall significance of effects on buried archaeology during construction would be Moderate Adverse, reducing to Neutral during operation.

6.13.3 As noted above in section 6.10, these conclusions are based upon research undertaken to date. A detailed heritage desk-based assessment is currently

being undertaken which would include targeted cartographic and documentary research as well as more in-depth analysis of the HER and a detailed analysis of previous disturbance along the routes. The assessment would also help to highlight additional areas of archaeological potential, or conversely may demonstrate reduced potential in areas of modern disturbance. The setting of designated assets would be considered in this assessment, and detailed site visits and photography will be undertaken. The assessment of setting would be used to determine any significant effects on the setting of heritage assets from the scheme and enable appropriate mitigation to be designed.

6.13.4 A specific CMP for the Hazlegrove House (Grade II Listed) Registered Park and Garden would be undertaken, which would identify the heritage significance of the various elements of the park, determine the impact of the scheme and inform the design and mitigation in this area as well as identifying appropriate enhancements to the park.

6.13.5 Archaeological monitoring of geotechnical ground investigations (GI) undertaken within the scheme is planned. It is likely that the GI will take place early in 2018. This will consist of on-site monitoring of geotechnical test-pits, monitoring of borehole drilling in archaeologically sensitive area and the archaeological analysis of borehole logs. This may assist in clarifying the level and extent of possible modern and post-medieval truncation at these points, as well as potentially the depth of possible alluvial deposits at the lower-lying locations. The results of the GI surveys will inform the assessment to be reported within the ES.

6.13.6 An archaeological geophysical survey was undertaken in December 2017 and January 2018. This is likely to be followed by targeted archaeological evaluation trenching, prior to the DCO submission. The surveys would inform mitigation, in the form of scheme design changes and can help establish pre-construction archaeological investigation strategies. Information relating to these aspects will be included as part of the ES, to be submitted as part of the DCO application.

7 Landscape

7.1 Introduction

7.1.1 This chapter presents the on-going work for the assessment of the potential effects associated with the proposed scheme upon surrounding landscape character and visual amenity during both construction and operation.

7.1.2 The assessment is undertaken in accordance with the DMRB Volume 11, Section 3, Part 5 'Landscape Effects'. Further detailed assessment is currently under way, and will be reported within the Environmental Statement (ES) that will be submitted to support the Development Consent Order (DCO) application.

7.1.3 Landscape encompasses many more elements than the common association which focuses merely upon the view or appearance of the land. The notion of landscape can be applied to both rural and urban environments with the term townscape frequently adopted within the urban context. From the perspective of environmental assessment, landscape applies to physical elements such as topography, drainage, land use, land management, and vegetation, as well as ecological, historical and cultural associations.

7.2 Legislation and policy context

National Policy Statement for National Networks

7.2.1 The National Policy Statement for National Networks (NPSNN)[47] states that, where a development is subject to an Environmental Impact Assessment (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 (Paragraph 5.156), but not be used in themselves to refuse consent. The Secretary of State will judge whether visual effects on sensitive receptors outweigh the benefits of the development (Paragraph 5.158).

7.3 Assessment methodology

7.3.1 The assessment methodology for defining the significance of effects upon landscape is contained within section 8.11 of the Environmental Impact

[47] 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 August 2017).

Assessment (EIA) Scoping Report submitted to the Planning Inspectorate in November 2017. The Scoping Report can be accessed here:

7.3.2 https://infrastructure.planninginspectorate.gov.uk/projects/south-west/a303-sparkford-to-ilchester/?ipcsection=docs.

7.4 Study area

7.4.1 To accord with the guidance given in DMRB Volume 11 Section 3 Part 5 Landscape Effects, the study area for the assessment extends 1 kilometre from the scheme limits. However, the study area has been extended for any receptors sitting outside of the 1 kilometre which have the capacity to experience significant effects as a result of the scheme (such as views from Cadbury Castle and St Michael's Hill located on elevated ground affording views to site).

7.5 Existing baseline

Landscape baseline - national and county level

7.5.1 The scheme is located within National Character Area 140 Yeovil Scarplands. At a county level *The Landscape of South Somerset, 1993, South Somerset District Council*, identifies the scheme as sitting within Visual Character Region 7- Central Plain Moors and river basins, Area 3 Lower Lias Clay Vales, Rivers and Floodplains. Key characteristics of these character areas are provided within Table 7.1 below.

Table 7.1: Landscape characteristics

Landscape character assessment	Character area reference	Key characteristics
National Character Areas as defined by Natural England	NCA 140 Yeovil Scarplands.	The Yeovil Scarplands run, in an arc, from the Mendip Hills around the southern edge of Mid Somerset Hills and the Somerset Levels and Moors to the fringes of the Blackdowns. Remote, rural landscape comprising a series of broad ridges and steep scarps separating sheltered clay vales. Less than 5% of the area is urban, though Yeovil, lying in south of area, has grown to become a sizeable town with a busy industrial zone. A long history of settlement reflected through archaeology, from Neolithic hill forts, through Roman villas, to remnant medieval open fields – along with many Listed Buildings.
The Landscape of South Somerset, 1993, South Somerset District Council	Visual Character Region 7- Central Plain Moors and river basins, Area 3 Lower Lias Clay Vales, Rivers and Floodplains (covers extent of study area).	Area 3 covers the entire study area extending from Ilchester in the west to Maston Magna and Lovington in the east. Extending from moors near Long Road north-east to the edge of Babcary and south-east to Rimpton, encompassing the flood plains of Rivers Cary, Yeo and part of the Brue. Area 3 can be divided into 2, either side of the long low limestone ridge at Sparkford Ridge is quite wooded with many calcareous-loving plants. North of Sparkford Ridge is a broad low vale encompassing the course of River Cary. Expanse of vale is crossed by several watercourses, mostly defined by Alders and Willows. South of Sparkford Ridge lies the Vale of Ilchester. Broad area of mixed farming, with arable mainly located on slightly drier clay ridges or islands. Hedges are generally kept low. Hedgerow trees are fairly infrequent.

Landscape character assessment	Character area reference	Key characteristics
		Royal Navy Air Station (RNAS) Yeovilton interrupts clay vale landscape by 'sea of concrete and outsize scale of buildings'. The sound of revving aircraft provides constant audible intrusion. Ilchester and West - great number of ditches and rhynes, often filled and few hedgerows. River Yeo has been straightened and embanked. A303 corridor provides a 'spinal column of steel concrete and tarmac inducing land use and scenery on its east-west trajectory.' Influence of road extends beyond the visual. Noise, particularly on its concrete sections, is carried miles down wind across the flat terrain. Extensive landscaping, kestrels hunting along corridors of rank grassland are a common site. Settlements lie on 'islands or ridges of better drained soils, on river gravel terraces or stretched along ridge top roads. Vulnerable features in south Somerset - hedges and hedgerow trees, woodlands, orchards, parklands. Concern of urbanising of the countryside.

Landscape baseline - the local landscape

7.5.2 The local landscape character within the vicinity of the scheme is heavily rural in character with the A303 forming a significant detracting feature dissecting the landscape as it runs on an east to west axis. Away from the A303, farmland dominates with fields of varying shapes and sizes. To the north of the A303, an open vale landscape is found with hedgerow field boundaries and woodland plots, some of which are ancient woodland. The low-lying topography in this area is managed through land drains which cross the landscape. The open and expansive landscape allows long distance visual connectivity across the vale to gently rising land in the north. Settlement is sparse to the north of the A303 with isolated farmsteads within 1 kilometre of the existing A303.

7.5.3 To the south of the A303, the ground falls away from the ridgeline to a series of villages which run along the base of the ridge. This includes settlements of West Camel and Queen Camel which are designated Conservation Areas. A series of Listed Buildings are also located in these villages and beyond. The River Cam runs along the bottom of the ridgeline passing through open fields as well as local villages. Vegetation is limited to field boundaries in the most part, and traces alongside the River Cam. Arable farming practices dominate the land use elsewhere.

7.5.4 There are no Areas of Outstanding National Beauty (AONBs), National Parks, or Heritage Coasts located within 1 kilometre of the scheme.

Landscape designations

7.5.5 Relevant landscape designations are highlighted on the Environmental Constraints Plan contained within in appendix A.1 of this report. Table 7.2 below highlights key designations within the study area and their distance from site.

Table 7.2: Landscape designations within 1 km of the scheme

Landscape designations within 1km	Distance
Queen Camel Conservation Area	Approximately 650m
West Camel Conservation Area	Approximately 450m
Hazlegrove House (Grade II Listed) Registered Park and Garden	Within scheme footprint
Leland Trail long distance footpath	Approximately 550m
Listed Buildings	Numerous within 1km; closest within just over 100m
Scheduled Monument	Camel Hill Farm within 15m. Downhead within approximately 300m

Visual baseline

7.5.6 The visual baseline has identified settlement hubs as well as notable viewpoints, in accordance with the guidance set out in IAN 135/10[48]; the visual receptors currently identified as part of the DMRB Simple level assessment can be seen in the drawing contained within appendix C.1. Given the rural nature of the study area and the presence of isolated farmsteads rather than larger village settlements to the north of the existing A303, farms have been grouped to essentially form their own small settlements to ensure they are captured at this stage of the assessment. To the south of the A303 small hamlets and villages are common place and have been identified in the usual way. Table 7.3 below highlighted the visual baseline description.

[48] Highways England (2010) Interim Advice Note 135/10 'Landscape and Visual Effects Assessment'.

Table 7.3: Visual baseline description

Visual receptor group	Approximate distance from scheme	Visual baseline description
Podimore	100m	Existing views north from the village are generally contained by vegetation running along the A303 as it runs from east to west a short distance to the north of Podimore. Despite the vegetation, glimpsed views to traffic travelling on the A303 immediately beyond can be seen, even during summer months. During the winter months, more open views are likely afforded from the village looking north and north east through bare vegetation onto the A303 and associated traffic. This linear belt of vegetation stops in line with the edge of the village which allows open views across flat agricultural fields to the A303 from the most north easterly extents of the village only. Views looking north from the southerly part of the village are set in the context of intervening built form of village properties, whilst views east look out upon arable fields before the notable presence of YNAS Yeovilton. Views south and west are again more of a rural nature.
Urgashay, Bridgehampton and Speckington	175m 400m 400m	The flat topography in this area, combined with numerous lines of mature field boundary vegetation encloses and heavily limits distant views from these small hamlets.
West Camel	280m	West Camel lies towards the base of rising ground which extends northwards to the ridgeline that traverses this area. Looking north, agricultural landscape dominates the view with managed hedgerow field boundaries. The rising topography prevents far reaching views from this location. Views to the A303 are afforded from the most northerly extents looking north east.
Wales	280m	Views are afforded over rising fields and hedgerows to the ridgeline to the north which accommodates the A303. Traffic can be seen above and through gaps in existing hedgerow, forming the horizon in this view.
Queen Camel	570m	Views are afforded from this settlement across rising agricultural ground which begins on the northern edge of the village, rising towards the local ridgeline which prevents long distance views. The existing A303 runs along this ridge and is not visible in the most part due to the location of the village at the bottom of the hillside and the steeply rising ground above. However, views from the most southerly aspects of the settlement do afford further reaching views to ridgeline beyond although a linear tree belt running along the top of the ridgeline prevents longer distance views.
Sparkford	60m	Vegetation along the northern boundary of Sparkford prevents views to the existing A303 from this location, enclosing and limiting views to a short distance only.
Downhead	Immediately adjacent	Existing views looking south capture a rural scene with numerous intermittent hedgerows breaking up long distance views.
Steart Hill (includes Vale Farm, Vale Farm Cottages, North Hill Farm, Steart Hill Farm and Pearsons Steeple)	100m	Looking south, long distance views are restricted due to rising landform building to the ridgeline that accommodates the existing A303. The current topography and intervening vegetation prevents views to either the A303 or associated traffic from this location.
Camel Hill (includes Camel Hill Farm, Camel Hill House)	Immediately adjacent	Looking south short distance views towards the existing A303 are restricted by intervening vegetation alongside the access lane to the A303 as well as the field bounding the A303. Where views may be afforded through gaps in vegetation, long distance views are restricted by the ridge line which the A303 runs along at this location.
Hazlegrove House	350m	Hazlegrove House and the associated Registered Park and Garden affords varying degrees of long distance views to the south and south-east from its elevated position. This includes views to the existing A303, including petrol station and local roadside diner which are pronounced built features amongst the vegetated ridgeline.
Sparkford Hill	30m	This group of residential properties located on Sparkford Hill Lane face west towards the A359. They afford restricted short distance views only, due to a mature hedgerow on the far side of the lane which forms the eastern boundary of the petrol station and services immediately opposite. This hedgerow prevents views to the proposed site and the A303 is not visible from this location.
South Barrow	1.2km	Views across raised plateau to the rear of Hazlegrove School. To the south-east, the opposing ridgeline can be seen although the A303 is not visible from this location.
Cadbury Castle	2.5km	Extensive far reaching panoramic views are afforded from this highly-elevated hill fort. Lowland fields defined by hedgerow field boundaries can be seen with areas of woodland belt and more substantial plots. Individual farm steads can be seen amongst an otherwise heavily rural landscape dominated by arable farming practices.
Babcary	2.8km	Varying degrees of view from this settlement. Some southern extents enclosed by mature hedgerow along local lane before moving east where extensive views open up over falling ground to the south.
St. Michael's Hill, Montacute	10km	This view from this elevated hill and 18th century tower is both panoramic and exceptionally far reaching given its height above the surrounding landscape. The village of Montacute can be seen below with RNAS Yeovilton visible beyond. Other more distant features are difficult to differentiate at this distance.

7.6 Value (sensitivity of resources and receptors)

Landscape value

7.6.1 Whilst the majority of the study area is not designated for its landscape value, it remains in the most part, an attractive and cohesive rural landscape with well-defined features and would be considered to be of moderate to high sensitivity across the study area as a whole.

7.6.2 The A303 does however provide a detracting feature both visually and audibly which around its immediate alignment brings about a decrease in tranquillity. One location that is designated with the study area is Hazlegrove House (Grade II Listed) registered Park and Garden. This parkland landscape has been designated as an interesting and representative example of an 18th century park, parts of which are of much earlier origin. Enough of the layout survives to reflect the original design, and a proportion of the original layout of its early-18th century formal garden is still visible; and is considered to be of great value. Its inherent value means it is sensitive to change both directly, but also indirectly through the notion of a borrowed landscape, when considering the connection with the wider environment and sensitivity to a change in the setting of the designated site.

7.6.3 At this stage of assessment, the landscape character of the study area as a whole, whilst not within an AONB or National Park, is considered to be high due to the presence of designated assets such as Hazlegrove House (Grade II Listed) Registered Park and Garden and the conservation areas to the south of the A303. The strong defined cohesive landscape has a well established sense of place adding to this value and sensitivity to change.

Visual receptor value

7.6.4 Under the guidance of Highways England's Interim Advice Note (IAN) 135/10 on Landscape and Visual Effects Assessment, the DMRB Simple level of assessment reported in this chapter focuses in the most part upon settlement groups rather than individual receptors. It also identifies key viewpoints in addition to settlements. Key views are ordinarily publicly accessible and frequently upon Public Rights of Way (PRoWs), which, as described in Table 7.2 above, PRoWs are considered to be highly sensitive receptors. Likewise, residential properties and in this instance settlement groups are also considered to be highly sensitive to change. An assessment to DMRB Detailed level is currently being undertaken and will focus on individual receptors that afford key views during both construction and operation, including those with lower sensitivity to change.

7.7 Consultation

7.7.1 In addition to the consultation described in section 2.7, a Chartered Landscape Architect has been party to consultation with Statutory Environmental Bodies regarding the potential impacts upon Hazlegrove House (Grade II Listed) Registered Park and Garden. This included a site visit with landscape and conservation specialists from Historic England and South Somerset District

Council where the potential effects and possible mitigation measures of the scheme was discussed. Further details can be sought in chapter 6 Cultural Heritage. Further consultation is currently on-going as part of the preparation of the Detailed Landscape and Visual Impact Assessment (LVIA) to agree key viewpoint locations with South Somerset District Council's Landscape Architect, and to develop mitigation measures further.

7.8 Assumptions and limitations

7.8.1 The information presented within this chapter is not a detailed LVIA and as such only high-level receptor groups have been identified, focusing on key views and settlement hubs only. As previously mentioned further detail would be addressed during Detailed level of assessment in line with guidance set out in IAN 135/10. The assessment was restricted to publicly accessible areas only and from the curtilage of private properties / residential receptors.

7.9 Design, mitigation and enhancement measures

Construction

7.9.1 During construction, similar mitigation measures should be implemented. These would include adhering to general best practice methods during construction, such as:

- Keeping a well ordered and tidy site, including keeping stockpiles to a minimum, with delivery of goods on an as needed basis
- Works should be limited to daylight hours in the most part, with any night works to be kept to a minimum
- Minimal, low level and directional lighting should be used for compound security and night works, whilst successfully meeting safety requirements
- Existing trees and vegetation to be retained should be protected during the construction phase with protective fencing, where deemed necessary and should be in accordance with BS 5837:2012

Operation

7.9.2 A general approach to mitigation design would be to include the lowering of the vertical alignment of the route including junctions, wherever practicable, keeping the scheme settled within the surrounding landscape as much as possible. This could be strengthened with the use of earth bunds as appropriate, as well as planting to aid the integration of the scheme with the surrounding landscape. Native hedgerows, hedgerows with trees, and blocks of planting would sit well within the vernacular land cover, reducing the visibility of the scheme.

7.9.3 Lighting columns, whilst currently proposed at key junctions only, should be kept to a minimum height and be directional to minimise impact on nearby properties and the wider night sky. Finally, any new structures should have a low solid to void ratio and consideration given to colour, form, and materials to minimise the visual prominence of these new features.

7.10 Assessment of effects

General construction effects

7.10.1 Construction effects may be short-term, long-term, temporary or permanent in nature. Potential impacts and effects in terms of landscape and visual amenity during construction include:

- Presence of construction traffic, plant and equipment
- Introduction / removal of built structures
- Storage of topsoil mounds
- Movement of excavated earth and change in the landform on site
- Temporary security fencing
- Construction compound
- Vehicle movements including private vehicles belonging to site staff
- Removal of mature tree and vegetation
- Presence and views of lighting for compounds and floodlighting when night work is required

General operation effects

7.10.2 Operational effects may be short-term, long-term, temporary or permanent in nature. Potential impacts and effects on landscape character and visual amenity during operation would result from:

- Increased road related infrastructure
- Loss of mature vegetation within and outside the existing highway boundary
- Additional slip roads and grade-separated roads and junctions increasing the overall width and perception of the road

Construction

7.10.3 Construction works would bring the introduction of new detracting features to the local landscape, with heavy machinery, materials stockpiling, compounds, and haul routes all associated with the works, as the existing A303 is widened. However, given the online or near online nature of the works, these new 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.

7.10.4 Views from visual receptors towards site during construction would see the introduction of new features within the view, as those described above. Given the varying sense of enclosure around the ridgeline the A303 runs along, the magnitude of change for each receptor would vary with the distance from site and nature of change in view. However, 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.

Operation

7.10.5 Given the scheme would have sections of being either online or very close to the existing A303 route corridor, the effects upon landscape character and nearby visual receptors would be minimised by keeping the impacts of major road corridors limited to an isolated area already characterised by a major highway. The expansion to dual-carriageway would however be at odds with the local landscape pattern and scale.

7.10.6 The eastern end of the route would have a direct effect upon the designated Hazlegrove House (Grade II Listed) Registered Park and Garden with views likely from elevated positions towards the scheme in the south. The scheme would also be in proximity to other designated assets, however they would not be directly affected by the scheme.

7.10.7 The scheme would 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. Views would be limited in some areas where the route would pass in cutting, aiding the visual integration of the scheme, and limiting views of associated traffic in some areas.

7.10.8 On balance, the overall effect is considered to be Slight Adverse by Year 15 of operation. Mitigation would aid the scheme's integration however the route would still not quite fit the landform and scale of the landscape and would still have an impact upon certain views. It is unlikely that the scheme could be fully mitigated, particularly at its eastern extents where it ties in to the existing A303 at Sparkford.

7.11 Monitoring requirements for significant adverse effects

7.11.1 Details regarding monitoring requirements during construction will be detailed within the ES, but it is likely that this will include the requirement for monitoring of construction practices to ensure all necessary controls are in place. These measures will be detailed within the CEMP.

7.11.2 Whilst long-term significant adverse effects are not anticipated, post-construction, monitoring should be undertaken to ensure that mitigation planting is developing to provide the visual screening, landscape integration or biodiversity value as was intended within the environmental design, and as reported within the LVIA, as well as other affected disciplines such as cultural heritage and nature conservation. Monitoring of vegetation establishment during the aftercare period will ensure successful mitigation of potentially significant adverse effects in the immediate periods after scheme opening. In the event of plant failure, action can be taken during the monitoring to rectify failures and ensure mitigation measures come to fruition.

7.12 Conclusions

7.12.1 It is considered that the scheme would result in an overall Significant Adverse effect during construction, for both the landscape character and the effects to

visual receptors. Individual visual receptors are also likely to be significantly affected.

7.12.2 The mainline of the scheme would be online or close to the existing A303 alignment, and therefore the implications on the wider landscape and surrounding visual receptors is lessened.

7.12.3 It is considered on balance that there would be a non-significant Slight Adverse effect by Year 15 for both landscape character and the effects to visual receptors.

7.12.4 An assessment to DMRB Detailed level is currently being progressed and will be included within the ES, to be submitted as part of the DCO application.

8 Biodiversity

8.1 Introduction

8.1.1 This chapter presents the on-going work for the l assessment of the potential effects of the scheme for ecology and nature conservation during both construction and operation.

8.1.2 The assessment is undertaken in accordance with the DMRB Volume 11, Section 3, Part 4 'Ecology and Nature Conservation'[49], IAN 130/10[50] and the guidelines for Preliminary Ecological Impact Assessment (EcIA)[51] produced by the Chartered Institute of Ecology and Environmental Management (CIEEM). Further detailed assessment is currently under way, and will be reported within the Environmental Statement (ES) that will be submitted to support the Development Consent Order (DCO) application.

8.1.3 Potential changes in the local ecology at sensitive receptors affected by the Scheme are considered with relevant policy and legislation, and in the context of existing air quality in the study area. The proposed works could result in the permanent loss of habitat suitable for notable species where the new carriageway would be constructed, both through direct and indirect effects. Temporary loss of habitat is also anticipated to be required to allow the works.

8.2 Legislation and policy context

8.2.1 The construction and operational activities for the scheme must comply with international and national nature conservation legislation, and with national and local biodiversity policies. The 2 main pieces of legislation relating to nature conservation are the Conservation of Habitats and Species Regulations 2010 and the Wildlife and Countryside Act 1981 (WCA 1981). Other key national policies which influence the ecology and nature conservation assessments are detailed below:

- The National Policy Statement for Networks National [52]
- National Planning Policy Framework [53]
- The Natural Environment and Rural Communities (NERC) Act 2006[54]

[49] Highways England, DMRB Volume 11, Section 3, Part 4 'Ecology and Nature Conservation'.
[50] Highways England (2010) IAN 130/10: Ecology and Nature Conservation Criteria for Impact Assessment.
[51] Chartered Institute of Ecology and Environmental Management (CIEEM) (2016) Guidelines for Ecological Impact Assessment in the UK and Ireland.
[52] 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 August 2017).
[53] Department for Communities and Local Government (2012) National Planning Policy Framework [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf (last accessed March 2017).
[54] Natural England (2006) Natural Environment and Rural Communities Act 2006.

- UK Post-2010 Biodiversity Framework[55]
- Biodiversity 2020: A strategy for England's wildlife and ecosystem service (2011)[56]

National policy

National Policy Statement for National Networks

8.2.2 Where the project is subject to an Environmental Impact Assessment (EIA), the applicant should ensure that the Environmental Statement (ES) clearly sets out any likely significant effects on internationally, nationally and locally designated sites of ecological or geological conservation importance (including those outside England) on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity and that the statement considers the full range of potential impacts on ecosystems.

UK Post-2010 Biodiversity Framework (2012)

8.2.3 The country strategies for biodiversity and the environment in each of the 4 countries of the United Kingdom underpin the UK Post-2010 Biodiversity Framework. The UK Biodiversity Framework supersedes the UK BAP 2007[57] and Conserving Biodiversity – the UK Approach (2007)[58]. The UK Framework sets out the overarching vision, strategic goals and priority activities for the UK's work towards international biodiversity targets. The Framework's overall vision is that "*by 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people*".

8.2.4 Objectives include, but are not limited to:

- Halt the loss of biodiversity and continue to reverse previous losses through targeted actions for species and habitats
- Restore and enhance biodiversity in urban, rural and marine environments through better planning, design and practice
- Develop an effective management framework that ensures biodiversity is considered in wider decision making

[55] Joint Nature Conservation Committee (JNCC) and Department for Environment, Food and Rural Affairs (Defra) (on behalf of the Four Countries' Biodiversity Group) (2012) UK Post-2010 Biodiversity Framework [online] available at: http://jncc.defra.gov.uk/pdf/UK_Post2010_Bio-Fwork.pdf (last accessed March 2017).

[56] Department for Environment, Food and Rural Affairs (Defra) (2011) Biodiversity 2020: A Strategy for England's Wildlife and Ecosystem Services [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69446/pb13583-biodiversity-strategy-2020-111111.pdf (last accessed November 2017).

57 UK Government (1994) UK Biodiversity Action Plan [online] available at: http://jncc.defra.gov.uk/PDF/UKBAP_ConBio-UKApproach-2007.pdf (last accessed November 2017)

58 Department for Environment, Food and Rural Affairs (Defra). 2007. Conserving Biodiversity – The UK Approach.

Biodiversity 2020: A strategy for England's wildlife and ecosystem service (2011)

8.2.5 In England, Biodiversity 2020: A strategy for England's wildlife and ecosystem services is the national strategy for biodiversity and environment, which supersedes the 'Working with the grain of nature - A Biodiversity Strategy for England 2002'. Biodiversity 2020's stated mission is "…*to halt overall biodiversity loss, support healthy well-functioning ecosystems and establish coherent ecological networks, with more and better places for nature for the benefit of wildlife and people.*" To focus activity and assess performance in achieving this mission, Biodiversity 2020 sets objectives relating to terrestrial and marine habitats and ecosystems, species and people. These include:

- Establishing coherent and resilient ecological networks, described as "*a network of high quality sites, protected by buffer zones, and connected by wildlife corridors and smaller, but still wildlife-rich, 'stepping-stone' sites*"
- Taking targeted action for the recovery of priority species whose conservation is not delivered through wider habitat-based and ecosystem measures
- Establishing Nature Improvement Areas and Marine Protected Areas;
- Bringing more Site of Special Scientific Interest (SSSIs) into favourable condition
- Reducing environmental pressures by working with sectors such as agriculture, forestry, planning and development

8.2.6 Legislation and policies specific to individual species likely to be present within the scheme extents are presented in appendix D.1.

8.3 Assessment methodology

8.3.1 The assessment methodology for defining the significance of effects upon biodiversity is contained within section 10.11 of the Environmental Impact Assessment (EIA) Scoping Report submitted to the Planning Inspectorate in November 2017. The Scoping Report can be accessed here:

8.3.2 https://infrastructure.planninginspectorate.gov.uk/projects/south-west/a303-sparkford-to-ilchester/?ipcsection=docs.

8.4 Study area

8.4.1 The Zone of Influence (ZoI) is the area surrounding a scheme within which the environmental conditions could be affected. The ZoI includes the following areas:

- Areas that will be lost to construction
- Areas that would be temporarily affected during construction
- Areas likely to be impacted by hydrological disruption
- Areas where there is a risk of pollution and noise disturbance during construction and/or operation

8.4.2 For ecological features, taking in to account the above factors, the ZoI is taken to be the scheme footprint and 250 metre radius around this. However, for certain features it is necessary to extend the ZoI to ensure effects are adequately assessed. The ZoI is calculated using the professional experience of the assessing ecologist, and following guidelines as presented within the generally accepted best practice guidance for the specific species or sites. Where this extension has occurred, this is presented in Table 8.1.

Table 8.1: Zone of influence extensions for species and habitats

Sensitive receptor	Zone of influence
Sites with national or international designations for nature conservation.	Up to 2km from the scheme footprint, in line with DMRB Volume 11, Section 4, Part 1 HD 44/09 'Assessment of Implications (of Highways and/or Roads Projects) on European sites (including Appropriate Assessment).
Sites with local designations for nature conservation.	Up to 2km from the scheme footprint.
Sites affected by changes in air quality with national or international designations for nature conservation	200m from roads that are expected to be affected by the scheme. The local Area Road Network (ARN)[59] is considered to extend from Wimbourne Stoke to Buckland St Mary or South Petherton. This covers an extent of approximately 90km and 75km respectively.
Great crested newt *Triturus cristatus*	500m from the scheme footprint.
Barn Owl	1.5km from the scheme footprint.
Badgers	500m from the scheme footprint.
Phase 1 habitat survey	500m from the scheme footprint.
Sites designated for bat populations	30km from the scheme footprint.

8.5 Existing baseline

8.5.1 This section describes the existing baseline, as it is currently known. Much of the information has been gathered through desk-top studies; the information on qualifying features of European and nationally designated sites was sourced from the Natura 2000 forms for each site, held on the Joint Nature Conservation Committee website. Some ground truthing has been carried out, in terms of protected species surveys, to check if suitable habitats are present.

Designated sites

8.5.2 For further details of all the designations below, reference should be made to the Joint Nature Conservation Committee website[60].

[59] Highways Agency (2007) Design Manual for Roads and Bridges Volume 11 Environmental Assessment, Section 3 Part 1 Air Quality. [online] available at: http://www.standardsforhighways.co.uk/ha/standards/dmrb/vol11/section3/ha20707.pdf (last accessed May 2017).

[60] JNCC (2018) Protected Areas [online] available at: http://jncc.defra.gov.uk/page-5332 (last accessed January 2018).

International

8.5.3 No internationally designated sites are present within 2 kilometres of the scheme, but the following internationally designated sites are located within 30 kilometres (for sites designated for bats) of the scheme.

- The Mells Valley SAC is located approximately 22 kilometres north of the scheme. Its primary reason for designation is due to the presence of the greater horseshoe bat (*Rhinolophus ferrumequinum)*. The qualifying features include habitats such as semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*).
- North Somerset & Mendip Bats SAC is located approximately 29 kilometres north of the scheme. Its primary reason for designation is due to the presence of greater horseshoe bats *Rhinolophus ferrumequinum* and lesser horseshoe bats *Rhinolophus hipposideros*. The qualifying feature includes habitats such as semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) and *Tilio-Acerion* forests of slopes, screes and ravines.
- Bracket's Coppice is located approximately 17 kilometres south of the scheme. Its primary reason for designation is due to the presence of Bechstein's bat *Myotis bechsteinii*. The qualifying feature includes habitats such as Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*).

Nationally designated sites

8.5.4 Sparkford Wood SSSI is located 1.2 kilometres north east of the scheme. It is of special interest due to the broadleaved semi-natural woodland which largely comprises penduculate oak *Quercus robur* together with locally common ash *Fraxinus excelsior* and an understory of hazel coppice *Corylus avellana*. The ground flora, which includes abundant bluebell *Hyacinthoides non-scripta*, varies in conjunction with different soil types which range from mildly calcareous to acid. The woodland supports a large population of homostyle primroses *Primula vulgaris* which are recognised to be of international significance.

8.5.5 There are 4 designated sites within 200 metres of the affected road network for the scheme:

- Whitesheet Hill SSSI
- Stockton Wood and Down SSSI
- Yarnbury Castle SSSI
- Parsonage Down SSSI

8.5.6 All the above designated sites, have been designated for the presence of chalk grassland which supports many notable, and in some cases rare, species of flora, some of which may be sensitive to NO_x and nitrogen deposition. In addition, the Stockton Wood and Down SSSI consists of scrub and woodland.

Regional

8.5.7 Regionally designated Local Wildlife Sites (LWS) within 2 kilometres are as follows:

- River Cary LWS is located 1.05 kilometres north-west
- Cogberry Plantation LWS is located 0.58 kilometres north-west
- Bower Plantation LWS is located 0.76 kilometres north-west
- Annis Hill LWS is located 0.36 kilometres north-west
- Home Ground Pond LWS is located 0.26 kilometres north
- Lindsay House Quarry LWS is located 0.55 kilometres north
- Vale Farm Field LWS is located 0.5 kilometres north
- Parsons Steeple LWS is located 0.38 kilometres north
- Yarcombe Wood LWS is located 0.94 kilometres north-east
- Gason Lane Field LWS is located 0.01 kilometres south
- Ridge Copse LWS is located 0.05 kilometres south
- Camel Hill Transmitter Site LWS is located adjacent to the scheme
- Hazlegrove Park LWS is within the footprint
- Sparkford Hill Copse LWS is located 0.48 kilometres northeast
- Downhead Manor Farm Candidate LWS is located 0.19 kilometres north

Habitats

8.5.8 Priority habitats within the scheme's ZoI consist of hedgerows, broadleaved semi-natural woodland, ditches, parkland, calcareous grassland and ponds (refer to appendix D.3 for details in full).

Protected and notable species

8.5.9 Surveys have been completed for the following species and are presented within appendix D.3:

- Bat activity surveys (completed October 2017)
- Bat roost surveys (completed September 2017)
- Breeding bird and barn owl surveys (completed August 2017)
- Dormouse surveys (partly completed September 2017)
- Reptile surveys (completed September 2017)
- Water vole and otter surveys (completed September 2017)
- Macro-invertebrate surveys (completed September 2017)
- National vegetation classification surveys (completed June 2017)
- Hedgerow surveys (completed October 2017)
- Terrestrial invertebrates: brown hair streak butterfly (November 2017)

8.5.10 Completion of surveys is required for the following species to further inform the mitigation methods and design. The findings of all the surveys will be reported in the ES:

- Badger bait marking surveys to be completed in March 2018 following the resolution of access constraints
- Dormouse surveys to be completed March 2018 following resolution of access constraints
- Terrestrial invertebrates: spring invertebrates (April 2018)

8.6 Value (sensitivity of resources and receptors)

8.6.1 An evaluation of the ecological receptors within or adjacent to the study area has been undertaken to inform this assessment. Table 8.2 below provides a list of the ecological receptors and their assigned ecological value.

Table 8.2: Site evaluation

Feature		Evaluation	Rationale
Designated sites	SAC for bats	Very High	Internationally designated sites with limited potential for substitution.
	SSSI	High	Nationally designated site with limited potential for substitution.
	LWS	Medium	Locally designated sites with potential for substitution.
Habitats	Broadleaved semi-natural woodland	High / medium	Regionally important habitat. Recognised on the Local BAP.
	Plantation broadleaved semi-natural woodland	Medium	Regionally important habitat. Recognised on the Local BAP.
	Parkland	Medium	Regionally important habitat. Recognised on the Local BAP.
	Species rich hedgerow	Medium	Regionally important habitat. Recognised as on the Local BAP.
	Species poor hedgerows	Low	Undesignated habitat of some local biodiversity and earth heritage interest.
	Calcareous grassland	Medium	Regionally important habitat. Recognised as in the Local BAP.
	Ponds and ditches	Medium	Regionally important habitat. Recognised in the Local BAP.
	Watercourses	Medium	Regionally important habitat. Recognised in the Local BAP.
Species	Bats	High	Species protected by European legislation.
	Dormouse	High	Species protected by European legislation.
	GCN	High	Species protected by European legislation.
	Otters	High	Species protected by European legislation
	Water Voles	Medium	Species protected by national legislation
	Breeding birds	Medium	Species protected by national legislation
	Barn owls	Medium	Species protected by national legislation
	Badgers	Low	Species protected by national legislation from a welfare perspective
	Reptiles	Medium	Species protected by national legislation
	Invertebrates	High / medium	Species protected by European /national legislation
	White clawed crayfish	High	Species protected by European legislation.

8.7 Consultation

8.7.1 A meeting was held with Natural England on the 2 May 2017 to discuss the proposed survey methodology for bats and other protected species, to develop

mitigation proposals and to confirm Natural England's current biodiversity principles. Minutes from the meeting can be found in appendix D.2. Consultation has now also progressed with Natural England in the form of the Environmental Technical Working Groups (TWGs) (refer to section 2.7 for further details); full details of this consultation will be included within the ES.

8.8 Assumptions and limitations

8.8.1 This assessment is based on information gathered from a desk study, Phase 1 habitat survey and protected species surveys. Further protected species surveys, as detailed in section 8.5.10 must be undertaken to establish the baseline fully. Not all land was intensively searched, due to the dense nature of some of the vegetation present on site and health and safety concerns, regarding surveying immediately adjacent to the live A303 carriageway.

8.9 Design and mitigation measures

8.9.1 An Ecological Mitigation Strategy will be prepared, 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 Construction Environmental Management Plan (CEMP) for the scheme, which will be prepared by the Contractor prior to construction. A Site Waste Management Plan (SWMP) will also be prepared outlining the correct handling, transport, and disposal of waste.

8.9.2 Once the status of protected and notable species is known, the scheme design has been frozen and the extent of vegetation clearance and earthworks are known, a landscape planting specification will be produced. Where the presence of European protected species (EPS) has been confirmed through further surveys, EPS mitigation licences will be obtained from Natural England (where required) which will contain a method statement giving details of appropriate mitigation to ensure no long-term effects on the species. Where there are no EPS constraints, but there are other factors requiring mitigation, such as nationally protected species, designated habitats and policy requirements, any unavoidable habitat loss should be off-set through landscape mitigation planting, which will be detailed in the Ecological Mitigation Strategy.

Construction

Designated sites

International

8.9.3 As the proposed scheme follows a similar alignment to the current A303, it is considered unlikely to affect foraging or commuting routes for bats, which are qualifying features of the SACs. However, mitigation measures have been proposed for bat species, to ensure any potential impacts are reduced. See section 8.10.14 for further details of mitigation proposed.

Regional

8.9.4 Direct effects to LWSs such as Hazlegrove Park, Downhead Manor Farm, Camel Hill Transmitter Site, Gaston Lane Field and Ridge Copse will be avoided where practicable. Where direct effects would result from the construction works, such as at Hazlegrove Park LWS and Downhead Manor Farm Candidate LWS, the mitigation measures may include: replacing lost habitat such as woodland, grassland and hedgerows. In terms of the botanical and invertebrate assemblages present, appropriate mitigation will be informed by the invertebrate and/or habitat surveys. This may include the translocation of plants / invertebrates to newly created habitats. In addition, the drainage assessment and design will provide attenuation storage to ensure that the existing highways drainage system is adequate to cope with the additional hard standing run-off.

Priority habitats

8.9.5 During construction, measures to mitigate the effects of dust on sensitive habitats could include the use of screens and sediment booms. Cutting, grinding or sawing equipment should use suitable dust suppression techniques such as water sprays or local extraction (e.g. suitable local exhaust ventilation systems). Materials with potential to produce dust should be removed from site as soon as possible, unless being re-used on site. Stockpiles being re-used should be seeded or fenced to prevent wind whipping. All vehicles should switch off engines when stationary to reduce air pollution, noise and vibration.

8.9.6 To minimise adverse effects on watercourses and associated species, measures would be taken to prevent or minimise any sediments entering the freshwater, using control measures as outlined in CIRIA C532 Control of Water Pollution from Construction Sites[61].

8.9.7 Loss of deciduous woodland and hedgerows would be minimised as far as practicable, and new areas of these habitats will be incorporated into the landscape design to ensure no net loss of habitat and a gain where practicable.

8.9.8 The loss of veteran trees within the Hazlegrove House (Grade II Listed) Registered Park and Garden should also be minimised. The scheme design has been sensitively designed to avoid the existing veteran trees. An arboricultural survey is still required to determine if construction will impact any tree roots within close proximity to excavations. This survey is programmed to take place at the beginning of 2018.

8.9.9 It is recommended that where hedgerows are removed to facilitate the works, these be replaced within the same location and any existing gaps planted with appropriate native species, where practicable. It is recommended that replacement hedgerows be species rich continuous intact hedgerows within the construction footprint, which would provide a wildlife corridor, visual screening to surrounding habitats and suitable habitat for nesting protected species.

[61] Master-Williams (2001) Control of water pollution from construction sites: Guidance for consultants and contractors. CIRIA C532 [online] available at: http://www.orkneywind.co.uk/advice/SEPA%20Pollution%20Advice/ciria%20c532.pdf (last accessed June 2017).

Specific hedgerows may need to be maintained for protected species mitigation, which will be determined once the protected species surveys are complete as part of the ES.

Protected and notable species

8.9.10 If the presence of EPS is confirmed and adverse effects are unavoidable, the legal requirements of the EPS licence conditions and the requirement of 'no net loss in biodiversity' in line with Section 40 of the NERC Act 2006 will guide the landscape planting requirements. In addition to habitat enhancement for protected species, mitigation and compensation with regards to off-setting habitat loss will also be required.

8.9.11 The loss of any habitat of conservation value would be replaced like-for-like as a minimum requirement. Habitats of negligible conservation value should not require mitigation for nature conservation.

8.9.12 Vegetation clearance and earthworks would be supervised by a suitably experienced ecologist in areas confirmed to have protected species present or habitat considered to have high potential for protected species. Toolbox Talks (protected species and invasive species with potential to be encountered on site) will be prepared and delivered onsite to all personnel by a suitably experienced ecologist, prior to any works commencing.

8.9.13 All vehicles should switch off engines when stationary to mitigate air pollution, noise and vibration disturbance during construction. During night works, hoods would be used to direct lighting away from features and habitat considered to be suitable for protected species, such as hedgerows, retained scrub and woodland.

Bats

8.9.14 Sensitive working methods would ensure that the risk of killing, injuring or disturbing bats is minimised. If any bat roosts are anticipated to be adversely affected by the works, a comprehensive mitigation strategy including a sensitive working method and a habitat replacement package would be required to accompany the EPS licence application to Natural England.

8.9.15 If lighting is required for the scheme, it would be kept to a minimum, to minimise effects on bats and other protected species. The following would be considered during the lighting design process:

- No bat roost, including access points, should be directly illuminated. If it is considered necessary to illuminate an area near a roost or roost access point, the lighting should be positioned to avoid the sensitive areas
- LED lighting produces no ultraviolet component and therefore is ideally suited as it greatly reduces the attraction of insects
- Lighting column (luminaires) design would restrict disability glare and minimise obtrusive light. Referring to Table A.1 'Luminous intensity classes' within EN 13201-2:2003 - G4, G5 & G6 correspond to

traditional full cut-off therefore as an absolute minimum G4 rating must be utilised, ideally a G6 rating is preferable however this greatly limits the number and type of luminaries available. Generally, luminaries should be mounted at a zero-degree tilt to further assist in the reduction of light pollution

- Lighting should be directed to where it is needed and light spill avoided. This can be achieved by the design of the luminaire and when required using accessories such as hoods, cowls, louvres and shields to assist in directing the light to the intended areas
- Landscaping should also be designed to provide light shielding to sensitive areas
- The height of lighting columns in general should be as low as practicable as the light at a low level reduces the ecological impact. However, there are cases where taller columns will enable light to be directed downwards at a more acute angle and therefore reduce horizontal spill light
- Lighting levels should be as low as current standards and guidelines allow. Lighting should only be provided in essential areas

8.9.16 All works likely to affect bats would be supervised and provision of Toolbox Talks would be given by a suitably qualified ecologist to all operatives prior to any works commencing. Once the scheme design has been finalised, the scale and quality of habitat suitable for bats will be assessed to confirm whether bat boxes would be installed or habitat enhancement would be recommended to compensate for the loss of suitable roosting, foraging or commuting habitat.

Breeding birds

8.9.17 During bird nesting season (generally taken as March to August inclusive), sensitive working methods, to minimise the impacts on nesting birds, would be implemented. If works commence in the bird breeding season a suitably experienced ecologist would carry out a nesting bird check on any vegetation to be cleared, or vegetation to be retained, but which is directly adjacent to major works, no more than 24 hours prior to works commencing. All vegetation clearance carried out outside the nesting bird season would be supervised by a suitably experienced ecologist.

8.9.18 Loss of suitable nesting bird habitat would be mitigated by replacement planting of hedgerows and the installation of bird boxes in woodland that experienced partial loss.

Barn owls

8.9.19 To compensate for any loss of breeding sites, replacement barn owl boxes would be required. These would be installed at least 1 kilometre away from any major highway, as early as pacticable in areas where evidence of occupation is already present. Barn owls are known to suffer high levels of mortality when attempting to cross roads and to minimise this risk, screening planting with closely spaced trees should be used along as much of the highway as practicable. Areas of rough grassland should be created within 500 metres of

the nest boxes or existing nest sites, to encourage foraging. If the areas are within close proximity of the road, continuous screening should be employed.

8.9.20 Any work required in close proximity to a nest site would take place outside of the breeding season. Breeding is considered to be between March to August, although eggs and fledglings can be present as late as October. Before work commences outside of this window, confirmation should be attained that any identified nest site is no longer active.

Water vole

8.9.21 Sustainable Drainage Systems (SuDS) would be incorporated into the detailed design to mitigate adverse effects on any ditches which water voles may use from siltation or pollution events.

Great crested newts

8.9.22 Sensitive working methods would ensure that the risk of killing, injuring or disturbing GCN is minimised. An EPS licence from Natural England would be required to allow the proposed works to be undertaken. The Method Statement of the EPS licence would detail a comprehensive mitigation strategy including translocation, a sensitive working method, timing of works and a habitat replacement package. Population monitoring would also be required as part of the EPS licence to ensure there is no long-term detrimental effect to the existing GCN population.

8.9.23 All vegetation clearance of suitable GCN habitat would be supervised by a suitably experienced, licensed ecologist and all site operatives would receive a Toolbox Talk prior to works commencing.

8.9.24 Habitat planting along the road verge would ensure there is no net loss of terrestrial habitat and provide areas of foraging for GCN.

Hazel dormouse

8.9.25 The requirement for mitigation for this species depends on the outcome of the dormice surveys. If no evidence of dormice is found during the surveys, it will be assumed that dormice are absent from the survey area and therefore this species will not be affected by the scheme. If dormice are found during the surveys, sensitive working methods would ensure that the risk of killing, injuring or disturbing dormice is minimised and an EPS licence from Natural England would be required to allow the proposed works to be undertaken. The Method Statement of the EPS licence would detail a comprehensive mitigation strategy including a sensitive working method, timing of works and a habitat replacement package. Population monitoring would be required as part of the EPS licence.

8.9.26 All vegetation clearance of suitable dormouse habitat would be supervised by a suitably experienced, licensed ecologist and all site operatives would receive a Toolbox Talk prior to works commencing.

8.9.27 Removal of vegetation will be replaced like-for-like as a minimum requirement. This will provide replacement foraging and shelter habitat for dormice to use, once established. Nest boxes will also be required to provide alternative habitat until the vegetation has established and provide monitoring data on the local dormouse population.

Otters

8.9.28 Otters have been identified in Dyke Brook, which is over 1 kilometre from the proposed scheme. Therefore, no mitigation is required for otters.

Reptiles

8.9.29 Sensitive working methods would ensure that the risk of killing or injuring (during hibernation and the active period) reptiles is minimised. All vegetation clearance and construction activities likely to harm reptiles would be supervised by a suitably experienced ecologist and all site operatives would receive a Toolbox Talk prior to works commencing.

8.9.30 A combination of habitat manipulation and translocation may be required, dependent on the numbers of reptiles recorded during the surveys and the degree of habitat loss. A suitable receptor site would need to be identified and would need to meet a list of criteria to determine its suitability. For example, there should not be a resident population of reptiles. Or, if a low population is present, the area would need to be enhanced to increase its carrying capacity. Reptile exclusion fencing may also be required to prevent reptiles re-entering the construction area.

Badgers

8.9.31 Works that directly affect active badger setts would require a development licence which would only be granted outside the breeding season (November – June). Any sett closure would need to be carried out under licence, with badgers permanently excluded from their setts to prevent them re-entering. Any open trenches should be covered overnight during the works to prevent badgers from becoming trapped. If this is not possible, then mammal ladders should be installed to allow any trapped mammals to escape safely.

8.9.32 Badgers are creatures of habit and will continue to use their pathways. Should the scheme cross these pathways, then badger proof fencing and the provision of mammal passes would be incorporated into the design to ensure badgers are excluded from accessing the live carriageway.

Invertebrates

8.9.33 Brown hairstreak butterflies have been identified. This species uses hedgerows to overwinter their eggs and the larvae predominantly feed on blackthorn. Any removal of hedgerows would be replanted and include species favourable to brown hairstreak. Other species recorded in the wider area include white letter hairstreak *Satyrium w-album*, Essex skipper, silver washed fritillary *Argynnes paphia* and brown argus *Aricia agestis*. Species rich grassland and shrubs will

be planted along the new road and include a mix of species which are favourable for the larval stages of these butterflies. Species should include privet, bramble, common rock rose *Helianthemum nummularium*, common dog violet *Viola riviniana*, cock's foot *Dactylus glomerata*, and common couch *Elytrigia repens*.

General

8.9.34 Ecological Toolbox talks should be given to contractors prior to the works commencing to make them aware of the legislation afforded to protected species, and the working practices implemented to minimise impacts on the sensitive habitats within the designated sites.

8.9.35 Although non-native and invasive species have not been identified onsite, Toolbox talks would be given to ensure contractors are aware of their legal obligations. If any are encountered, the contractor must seek further guidance to prevent spreading and breach of legislation.

8.9.36 Deer proof fencing will be incorporated into the design to minimise risk of collision with oncoming traffic.

Operation

8.9.37 Replacement habitats would be implemented through planting works in the first available planting season following completion of construction works. Any opportunities for early planting in areas that would not be affected during construction will be explored in the ES.

8.9.38 A 3-year aftercare period would follow completion of the works. During this time, maintenance activities will be undertaken to ensure the successful establishment of planting and provision of new habitats.

8.9.39 Maintenance and monitoring tasks will be prescribed in the Landscape and Ecological Management Plan (LEMP). This will include the replacement of failed or defective plants. Long-term maintenance objectives and activities would be provided in the Handover Environmental Management Plan (HEMP) which would be issued at the end of the aftercare period. The HEMP would detail maintenance and monitoring for Years 3 to 20 and would be consistent with the wider landscape and habitat management routine of the surrounding highway network. The HEMP will ensure the on-going success of habitat reinstatement to maturity.

8.10 Assessment of effects

8.10.1 This section describes the residual effects that are likely for each option following implementation of the mitigation within section 8.9, and the ecological receptors at each option. Table 8.3 below presents a summary of the value of receptors, magnitude of impact and significance of effects for the construction and operational phases of the scheme.

Construction

Designated sites

8.10.2 The scheme is located within 30 kilometres of Mells Valley SAC, North Somerset and Mendip Bats SAC and Bracket's Coppice SAC, which are designated for bat conservation. However, due to the distance between the SACs and the scheme, no direct adverse effects such as habitat loss, noise and air pollution are anticipated. As the scheme follows a similar alignment to the current A303 and is considered unlikely to affect foraging or commuting routes, no effect on any of the bat SACs is considered likely.

8.10.3 No significant effects on the integrity of Sparkford Wood SSSI are anticipated as the site is over 1 kilometre away from the scheme. Therefore, it is considered that Sparkford Wood SSSI is at a sufficient distance for it not to be directly affected by the works.

8.10.4 In relation to air quality and the affected road network, Stockton Wood and Down SSSI is located 10 metres from the nearest affected road, Yarnbury Castle SSSI is 83 metres away, Whitesheet Hill SSSI is located 152 metres away, and Parsonage Down SSSI 196m. Construction activities could increase the risk of a pollution incident, such as contaminated land run-off or spills / leaks of oils and fuels and increased levels of airborne pollutants during the construction phase may occur.

8.10.5 Part of Hazlegrove Park LWS is located within the footprint of the scheme. There will be a partial loss (<1%) of the LWS from its periphery to accommodate the new roundabout and access road.

8.10.6 The scheme is also adjacent to Camel Hill Transmitter Site, Gason Lane Field and Ridge Copse LWSs. Construction activities could increase the risk of a pollution incident, such as contaminated land run-off or spills / leaks of oils and fuels.

8.10.7 Downhead Manor Farm Candidate LWS is located approximately 190 metres from the scheme. This is at a sufficient distance to not be directly impacted during construction by habitat loss, noise and light disturbance. However, increased levels of airborne pollutants during the construction phase may occur.

8.10.8 The remaining LWSs are located over 300m from the scheme and are considered to be at a sufficient distance to not be directly or indirectly impacted by the scheme. Therefore, they are not considered any further.

Habitats

8.10.9 The ecological importance of the habitats present has been assessed against their presence on Section 41 of the Natural Environment and Rural Communities Act (NERC, 2006), the UK and Local BAPs and their potential to support protected or notable species.

8.10.10 Small scale direct loss of broadleaved woodland, parkland, hedgerows and ditches is likely to occur for the scheme. Wildlife using the area would likely be subject to increased disturbance.

8.10.11 To enable construction, 1.64 hectares of broadleaved woodland would be directly affected. It is anticipated that 2 species rich hedgerows, 45 species poor hedgerows and 5 ditches would also be intersected by the scheme. One veteran tree from within the parkland would require removal and the scheme would also intrude into the root protection area (RPA) of 2 other veteran trees.

8.10.12 Other possible impacts to habitats would be associated with pollution from mobilised suspended solids and spillages of materials associated with routine run-off or spillages and increased levels of airborne pollutants during the construction phase. Works in close proximity to trees would have the potential to adversely affect them through ground compaction, thereby causing damage to the root system.

8.10.13 There would be no direct loss of priority habitats such as ponds and calcareous grassland, therefore these are not considered further in the assessment.

Protected species

Bats

8.10.14 During construction, it is anticipated that both habitats and species such as bats would experience increased disturbance from lighting, noise and a decrease in air quality (up to 30 kilometres from the scheme).

8.10.15 Direct and indirect impacts on bats are considered likely, due to the following factors:

- Artificial lighting used during construction could affect the feeding behaviour of bats, some species, including pipistrelle and serotine, feeding on insects attracted to light from external lighting with a high ultraviolet content. This behaviour is not common to all bat species, as the slower flying broad winged species such as long eared bats, myotis species, barbastelle and greater and lesser horseshoe bats generally avoid light
- Insects may be attracted to lit areas from a distance, potentially reducing the food source for bats feeding in more natural darker locations
- Artificial lighting is thought to increase the chances of bats being preyed upon. Many avian predators will hunt bats which may be one of the reasons that bats avoid flying in the day
- Artificial lighting disrupts the normal 24-hour pattern of light and dark which is likely to affect the natural behaviour of bats. Bright lighting may reduce social flight activity and cause bats to move away from the lit area. Studies have shown that continuous lighting along roads creates barriers which some species cannot cross
- Lighting can be particularly harmful if used along river corridors, near woodland edges and near hedgerows used by bats. In mainland

Europe, in areas where there are foraging or commuting bats, stretches of road are left unlit or lighting is designed in such a way as to avoid isolation of bat colonies

8.10.16 The vegetation clearance required to construct the scheme would result in the loss of small areas of broadleaved woodland and hedgerows located in close proximity to the existing A303. The removal of vegetation would be likely to temporarily disrupt foraging areas, however, the extent of this is considered small scale as there is an abundance of other foraging areas available. The existing A303 is also considered to be an existing barrier to bats due to the frequent use of HGVs. Therefore, the development of the scheme is not going to create a new barrier to dispersal as the existing baseline already has this present.

Breeding birds

8.10.17 If works are to commence during the nesting bird season, breeding birds are likely to be disturbed by noise, lighting (if night works) and vibration due to suitable habitat located adjacent to the works. Vegetation clearance is also likely to reduce the habitat available for breeding birds within the ZoI.

Barn owls

8.10.18 Existing records do show barn owls are present within the wider landscape.

8.10.19 As barn owls are a Schedule 1 species, birds and their nests are protected under the WCA (1981). If a nest site would be disturbed or lost as a result of works in the vicinity, this would result in an effect on the local barn owl population and could constitute an offence.

Badgers

8.10.20 Although the badger bait marking surveys are yet to be completed, existing survey information gathered during 2016 and 2017 has identified a number of setts within the scheme footprint. The construction of the scheme would directly affect several outlier setts. Construction works within 30 metres of existing badger setts has the potential to disturb badgers and potentially damage setts.

Great crested newts

8.10.21 The construction works would result in the loss of medium quality terrestrial habitat for GCN, including habitats such as woodland and hedgerows. However, no ponds would be directly affected. Vegetation clearance of habitat suitable for GCN has potential to adversely affect this species as a result of disturbance or direct injury, potentially leading to death. In addition, the works have potential to cause noise, vibration and light (if night works) disturbance during construction.

Dormice

8.10.22 If this species was present within the ZoI (surveys not yet completed) the species could be affected by works resulting in the loss and severance of low to

medium quality dormouse habitat. Vegetation clearance of habitat suitable for dormice has the potential to adversely affect this species as a result of disturbance or direct injury, potentially leading to death. In addition, the works have potential to cause noise, vibration and light (if night works) disturbance during construction.

Otters

8.10.23 No evidence of this species within the ZoI has been identified during the surveys. Therefore, the scheme is not anticipated to affect this species.

Water vole

8.10.24 Construction activities could increase the risk of a pollution incident, such as contaminated land run-off or spills / leaks of oils and fuels. Such pollution incidents and changes in hydrological environment could reduce the habitat available for this species.

Reptiles

8.10.25 The works have potential to cause noise, vibration and light (if night works) disturbance during construction. There would be habitat loss for reptiles due to construction works and to accommodate design. In addition, vegetation clearance and earthworks in suitable reptile habitat have potential to adversely affect reptiles as a result of disturbance or direct injury, potentially leading to death.

Invertebrates

8.10.26 The scheme largely affects poor semi-improved grazed grassland and arable fields located adjacent to the existing A303. These habitats offer low potential for notable terrestrial invertebrate species. Part of the scheme would be located within Hazlegrove LWS which is partly designated for its invertebrate species. However, the scheme has been designed to minimise any loss or damage to the existing veteran trees, which provide habitat for these invertebrate species. Therefore, it is not anticipated that the scheme would have any significant adverse effect on terrestrial invertebrates.

8.10.27 There are 2 ditches within close proximity to the footprint of the works, at the eastern extent of the scheme. Construction activities could increase the risk of a pollution incident, such as contaminated land run-off or spills / leaks of oils and fuels.

Operation

Designated sites

8.10.28 As the scheme follows a similar alignment to the current A303 and is considered unlikely to cause fragmentation of habitats or effect foraging or commuting routes, no impact on any of the bat SACs is considered likely.

8.10.29 The scheme is predicted to lead to an increase of approximately 2,000 to 3,000 vehicles a day on the section of the A303 near Sparkford and Ilchester. This change is likely due to the improved alignment along the A303 road as a result of the scheme, will encourage traffic to use this section of the A303 instead of local B roads.

8.10.30 It is anticipated that there would be a small increase in NO_x concentrations at the boundary of the Stockton Wood and Down SSSI, which is predicted to be exceeding the NO_x annual objective in the opening year Do Minimum and Do Something scenarios. Further assessment will be undertaken as part of the ES for this designated site to assess whether the predicted changes in NO_x concentrations and nitrogen deposition are significant. Refer to sections 5.10.9 to 5.10.14 of chapter 5 Air Quality.

8.10.31 Predicted NOx concentrations at the remaining ecological receptor locations (Whitesheet Hill SSSI, Yarnbury Castle SSSI and Parsonage Down SSSI) are below 30µg/m^3 and changes are imperceptible. Therefore, these receptors will not be considered further.

8.10.32 Once operational, the new dual-carriageway would result in traffic travelling at higher speeds compared to the existing A303. However, as Sparkford Wood SSSI is located over 1km from the carriageway and is considerably outside the ZoI for air quality impacts (>300m), it is considered that the SSSI is at a sufficient distance for it not to be directly or indirectly affected by the scheme.

8.10.33 Once operational, there would be a permanent but very small loss of Hazlegrove Park LWS due to the new roundabout and access road. The habitats lost would include a small area of broadleaved woodland and grazed poor semi- improved grassland. This loss would represent <1% of the total LWS and is located along its periphery. Therefore, the integrity of the LWS is still maintained. Habitat planting will also be incorporated into the landscape design to create areas of woodland, shrubs and species rich grassland, which once established, would be of benefit to invertebrate species and compensate for the loss of LWS habitat.

8.10.34 Once operational, it is not anticipated that the scheme would adversely affect either Camel Hill Transmitter Site, Gason Lane Field, Ridge Copse or, Downhead Manor Farm LWSs. The sites are already subjected to the existing A303 and exposed to car emissions to varying degrees. The change from single to dual-carriageway is not anticipated to significantly change in terms of air quality and emissions. Therefore, it is considered that there would be no degradation of habitats within any of the LWSs.

Habitats

8.10.35 The scheme would result in the small scale direct loss of broadleaved woodland, parkland, hedgerows and ditches. There would be a short-term adverse effect whilst the replacement planting establishes. However, once established, it is anticipated that there would not be any significant adverse effects to habitats of conservation value.

Protected species

Bats

8.10.36 There would be a short-term adverse effect whilst the replacement planting establishes. Once established, this would provide replacement foraging and potentially commuting habitat for bats to use.

8.10.37 Under the current design, it is not proposed that there would be lighting along the length of the scheme. Therefore, no effects arising from light disturbance are anticipated.

8.10.38 The A303 is considered to form an existing barrier to bats, due to the frequent use of HGVs and heavy traffic. Therefore, the realignment of the scheme is not considered to create a new barrier to dispersal when compared to the existing baseline present. In the long-term, it is not anticipated that there would be any significant adverse effects on bats.

Breeding birds

8.10.39 There would be a short-term adverse effect whilst the replacement planting establishes. In the interim, bird boxes would provide instant replacement habitat in woodlands that would experience partial loss. This would ensure there are no long-term significant effects on breeding birds.

Barn owls

8.10.40 There would be a short-term adverse effect whilst the replacement planting establishes.

8.10.41 Under the current design, it is not proposed that there would be lighting along the length of the scheme. Therefore, no effects arising from light disturbance are anticipated.

8.10.42 The existing A303 is considered to be an existing barrier to barn owls due to the frequent use of HGVs and heavy traffic. Therefore, the realignment of the scheme is not considered to create a new barrier to dispersal when compared to the existing baseline. In the long-term, it is not anticipated that there would be any significant adverse effects to barn owls.

Badgers

8.10.43 Once operational, it is considered that the scheme would form a barrier to dispersing badgers and is likely to result in increased mortality with live traffic. At the eastern extent, the new access road and roundabout would result in further barriers to badger movements. However, with the incorporation of badger proof fencing and mammal underpasses, it is anticipated that direct mortality of badgers would be reduced.

8.10.44 The reinstatement habitat planting would provide long-term foraging and sett construction areas. Therefore, it is not anticipated there would be any significant adverse effects to badgers.

Great crested newts

8.10.45 There would be a short-term adverse effect whilst the replacement planting establishes. The lost habitat would be replaced with native planting of higher value for GCN, such as woodland, shrubs, hedgerows and species rich grassland. There would be no loss or indirect effects to breeding ponds and it is not anticipated that there would be any long-term significant adverse effects on GCN.

Dormice

8.10.46 If this species is present within the ZoI (surveys not yet completed) works could affect the species due to the small-scale loss of broadleaved woodland, notably around the registered park and garden and hedgerows adjacent to the A303.

8.10.47 It is not considered that the scheme would create any barriers to dispersal or result in isolation of habitats, when compared to the existing baseline.

8.10.48 There would be a short-term adverse effect whilst the replacement planting matures. However, in the long-term, it is not anticipated that there would be any significant adverse effects on dormice.

Otters and water vole

8.10.49 The scheme is not anticipated to directly affect any water courses used by otters and/or water vole or result in fragment or isolation of habitats that these species may use. Once operational, there is potential for indirect effects due to pollution events and sediment changes, which may filter through the ditch network. However, this is considered not to have a measurable change on these species or habitats. In the long-term, it is not anticipated that there will be any significant adverse effects on either species.

Reptiles

8.10.50 The scheme would result in the loss of low quality habitats for reptiles, such as species-poor hedgerows, arable field margins, and the existing A303 verge. However, these habitats would be replaced with habitats of a higher quality such as species rich grassland, native shrubs and hedgerows. This would provide reptiles with areas for both foraging and shelter and the new roadside embankments would also provide basking opportunities. Therefore, in the long-term, it is not anticipated that there would be any significant adverse effects on common reptiles.

Invertebrates

8.10.51 The scheme would largely affect poor semi-improved grazed grassland and arable fields located adjacent to the existing A303. Replacement habitat such

as grassland and hedgerows would be planted along the majority of the scheme, providing additional habitats for a variety of invertebrate species. Therefore, it is not anticipated that the scheme would have any significant adverse effects on terrestrial invertebrates.

8.10.52 The scheme is not anticipated to directly affect any water courses used by aquatic macroinvertebrates. Once operational, there is potential for indirect effects due to pollution events and sediment changes, which may filter through the ditch network. However, this is considered not to have a measurable change on these species or their habitats. In the long-term, it is not anticipated that there would be any significant adverse effects on aquatic invertebrates.

Table 8.3: Summary of assessment of significance of effect

Receptor		Summary of effects	Mitigation	Sensitivity	Magnitude (with mitigation)	Overall significance of effect with Mitigation
Receptors and impacts						
Natura 2000 Sites	Mells Valley SAC	No adverse effects anticipated.	If bat roosts are found, requirements of the EPS licence conditions would guide the landscape planting and other mitigation (to avoid disturbing bat roosts). Mitigation for foraging and commuting routes would include habitat enhancement and compensation; green bridge or similar structure to maintain connectivity, offsetting habitat loss. Landscaping design would provide a barrier between active road and wider landscape. Vegetation clearance and earthworks to be supervised by a suitably experienced ecologist. Lighting and noise disturbance would be minimised through implementation of method statement. Operational lighting is not currently in the design, however, if required, follow best practice guidelines regarding light spill, and wave length. At detailed design stage, the requirement for and type / number of bat boxes to be installed will be finalised.	Very High	*No change* (construction or operational phase)	Neutral (construction and operation).
	North Somerset & Mendip Bats SAC	As above.	As above.	Very High	*No change* (construction or operational phase).	Neutral (construction and operation).
	Bracket's Coppice SAC	No adverse effects anticipated for either option due to the distance and type of qualifying feature.	Not applicable.	Very High	**Construction Phase:** *No change.* **Operational Phase:** *No change.*	Neutral (construction and operation).
Nationally designated sites	Sparkford Wood SSSI	Potential for increased level of airborne pollutants.	Sparkford Wood SSSI is located over 300m from the scheme and outside the ZoI for air quality effects, no mitigation required.	High	**Construction Phase:** *No change.* **Operational Phase:** *No change.*	Neutral (construction and operation).
	Whitesheet Hill SSSI; Stockton Wood and Down SSSI; Yarnbury Castle SSSI; and, Parsonage Down SSSI.	Potential for increased level of airborne pollutants.	Best practice measures implemented to store, handle, transport and dispose of waste, SWMP and CEMP to be prepared and implemented.	High	**Construction Phase:** Potential for pollution events and changes in airborne pollutants. *Minor adverse.* **Operational Phase:** No change for Whitesheet Hill SSSI Yarnbury Castle SSSI Parsonage Down SSSI Minor adverse for Stockton Wood and Down SSSI.	Slight Adverse (construction phase). Neutral (operation phase). Slight Adverse / Moderate Adverse (operation phase). *Further assessment will be undertaken to determine whether the predicted changes in NOx concentrations and nitrogen deposition are significant.*
Locally designated sites	Hazlegrove Park LWS	Potential for pollution incidents and changes in airborne pollutants. Loss of LWS (<1%) Potential for loss of veteran trees	Loss of any habitat of conservation value would be replaced like-for-like as a minimum requirement. Landscape planting to be of value for biodiversity, including areas of species rich grassland, hedgerows and woodland. Invertebrate and botanical surveys to be undertaken on LWS to assess the impact and inform mitigation. Possible translocation of plants / invertebrates to newly created habitats. Best practice measures implemented to store, handle, transport and dispose of waste, SWMP and CEMP to be prepared and implemented. Working methodology in accordance with CIRIA C532: Control of Water Pollution from Construction Sites.	Medium	**Construction Phase:** Potential for pollution events and changes in airborne pollutants. Loss of habitat within LWS *Minor adverse.* **Operational Phase:** *Minor adverse.*	Slight Adverse (construction and operation).
	Downhead Manor Farm Candidate LWS	Potential for pollution incidents and changes in airborne pollutants.	Loss of any habitat of conservation value would be replaced like-for-like as a minimum requirement.	Medium	**Construction Phase** Potential for pollution events and changes in airborne pollutants.	Slight Adverse (construction phase).

Receptor		Summary of effects	Mitigation	Sensitivity	Magnitude (with mitigation)	Overall significance of effect with Mitigation
			Landscape planting to be of value for biodiversity, including areas of species rich grassland, hedgerows and woodland. Invertebrate and botanical surveys to be undertaken on LWS to assess the impact and inform mitigation. Possible translocation of plants / invertebrates to newly created habitats. Best practice measures implemented to store, handle, transport and dispose of waste, SWMP and CEMP to be prepared and implemented. Working methodology in accordance with CIRIA C532: Control of Water Pollution from Construction Sites.		**Operational Phase:** *Minor adverse.*	Neutral (operation).
	Annis Hill Woodland LWS	No adverse effects anticipated.	Best practice measures implemented to store, handle, transport and dispose of waste, SWMP and CEMP to be prepared and implemented. Working methodology in accordance with CIRIA C532: Control of Water Pollution from Construction Sites.	Medium	*No change (construction or operational phase).*	Neutral (construction and operation).
	Camel Hill Transmitter Site LWS, Gaston Lane Field LWS, Ridge Copse LWS, Vale Farm Field LWS, Yarcombe Wood LWS	Potential for pollution incidents and changes in airborne pollutants.	Incorporate SuDS into detailed design to mitigate adverse impacts from run-off. Best practice measures implemented to store, handle, transport and dispose of waste, SWMP and CEMP to be prepared and implemented. Working methodology in accordance with CIRIA C532: Control of Water Pollution from Construction Sites. Habitat planting will be placed along the length of the scheme and act as a buffer and screen to the wider landscape and LWS.	Medium	**Construction Phase:** Potential for pollution events and changes in airborne pollutants. Minor adverse. **Operational Phase:** Negligible.	Slight Adverse (construction phase). Neutral (operational phase).
Priority Habitats	Hedgerows	Removal of hedgerows to facilitate construction works, loss of hedgerows to accommodate design.	Hedgerows removed to facilitate the works, to be replaced and enhanced. Species rich hedgerows to be incorporated into landscape design. Specific hedgerows may be required to be maintained for protected species mitigation. This will be addressed as part of the ES, once protected species surveys are complete.	Medium	**Construction:** Removal of hedgerows to facilitate construction works. Minor Adverse **Operation:** Negligible	Slight Adverse (construction phase). Slight Adverse reducing to Neutral (operational phase).
	Broadleaved semi-natural woodland	Removal of small areas of woodland to facilitate construction works, loss of woodland to accommodate design.	Woodland removed to facilitate the works, to be replaced and enhanced. Woodland to be incorporated into landscape design, including native and locally sourced species. Additional woodland planting may be required for protected species mitigation. This will be addressed as part of the ES, once protected species surveys are complete.	Medium	**Construction:** Potential for pollution incidents and change in sediment dynamics. Loss of woodland to facilitate construction works and to accommodate design. Minor Adverse. **Operation:** Negligible Adverse.	Slight Adverse (construction phase). Slight Adverse reducing to Neutral (operational phase).
	Parkland	Limited loss of this habitat to accommodate design. Potential loss of veteran trees	Woodland and species rich grassland to be incorporated into landscape design, including native and locally sourced species to compensate for lost habitat, although not a direct replacement. Arboricultural assessment required on final design to determine if trees are to be affected. The design has considered the location of veteran trees and been realigned to mitigate direct impacts on veteran trees. Best practice measures implemented to store, handle, transport and dispose of waste, SWMP and CEMP to be prepared and implemented. Working methodology in accordance with CIRIA C532: Control of Water Pollution from Construction Sites.	Medium	**Construction:** Potential for pollution incidents. Limited loss of this habitat to accommodate design. Minor Adverse. **Operation:** Minor adverse.	Slight adverse (construction and operation).
	Ditches	Limited loss of some habitat to facilitate construction works and to accommodate design.	Loss of any habitat of conservation value would be replaced like-for-like as a minimum requirement or enhanced where this is not feasible.	Medium	**Construction Phase:** Loss of some habitat to facilitate construction works and to accommodate design. Minor Adverse. **Operational Phase:** Negligible Adverse.	Slight Adverse (construction). Neutral (operation).
Protected and Notable Species	Bats	Fragmentation of foraging and commuting routes, due to vegetation clearance, lighting and noise disturbance. Potential for disturbance, damage to or loss of bat roosts.	If bat roosts are found, requirements of the EPS licence conditions will guide the landscape planting and other mitigation (to avoid disturbing bat roosts). Mitigation for foraging and commuting routes would include habitat enhancement and compensation; offsetting habitat loss. Landscaping design would provide a barrier between active road and retained vegetation.	High	**Construction Phase:** Fragmentation of foraging and commuting routes, due to vegetation clearance, lighting and noise disturbance. Potential for disturbance, damage to or loss of bat roosts. Minor Adverse **Operational Phase:** Potential for disturbance, damage to or loss of bat roosts.	Slight Adverse (construction). Slight Adverse reducing to Neutral (operation)

Receptor		Summary of effects	Mitigation	Sensitivity	Magnitude (with mitigation)	Overall significance of effect with Mitigation
			Vegetation clearance and earthworks to be supervised by a suitably experienced ecologist. Lighting and noise disturbance would be minimised through implementation of the method statement. Operational lighting will either not be included in design, or follow best practice guidelines regarding light spill, and wave length. At detailed design stage, the requirement for and type / number of bat boxes to be installed will be finalised.		Minor Adverse.	
	Breeding birds	Loss of vegetation and disturbance reduces nesting potential within construction and operational area Vegetation clearance could result in the destruction of nests and eggs, and killing/injuring of birds.	Vegetation clearance (including reedbeds) to be undertaken outside of breeding bird season (March to September inclusive) or sensitive working methods within this season. Loss of suitable nesting bird habitat mitigated by landscape planting incorporating breeding bird habitats and installation of bird boxes in woodland that experienced partial loss.	Medium	**Construction Phase:** Loss of vegetation and disturbance, potential of killing and injuring and destruction of nests. Decrease in nesting habitat. Minor Adverse. **Operational Phase:** Loss of vegetation and disturbance. Negligible Adverse.	Slight Adverse (construction). Neutral (operation).
	Barn Owls	Loss of foraging habitat; Loss of nesting sites; Direct mortality through vehicle collisions	The specific areas for mitigation will be informed by the survey results and will be presented within the ES. Provision of barn owl nest boxes should be located over 1km away from any major highway. High levels of mortality are caused by barn owls attempting to cross roads. To minimise this risk, screen planting of closely spaced trees should be used along as much of the highway as practicable. Areas of rough grassland should be created for foraging. These should be within 500m of the nest boxes or existing nest sites. If the areas are within close proximity of the road, continuous screening should be employed.	High	**Construction Phase:** Disturbance, loss of foraging habitat and potential loss of nesting sites. Minor Adverse. **Operational Phase:** Minor Adverse.	Slight Adverse (construction and operation).
	Dormice	Loss and severance of low to medium quality dormouse habitat. Vegetation clearance resulting in the disturbance or direct injury/death of dormice. Noise vibration and light (if night works) disturbance during construction and operation.	If dormice are found, requirements of the EPS licence conditions would guide the landscape planting and other mitigation. Mitigation would include habitat enhancement and compensation; offsetting habitat loss. Landscaping design will provide a barrier between active road and retained vegetation. Vegetation clearance and earthworks to be supervised by a suitably experienced ecologist. Lighting and noise disturbance would be minimised through implementation of method statement. Provision of nest boxes to compensate for lost habitat. Monitoring surveys	High	**Construction Phase:** Fragmentation of habitat due to vegetation clearance, lighting and noise disturbance. Potential for disturbance. Minor Adverse **Operational Phase:** Potential for disturbance. Minor Adverse.	Slight Adverse (construction and operation).
	Badger	Loss and severance of low to medium Vegetation clearance resulting in the disturbance or direct injury/death of badger. Noise, vibration and light (if night works) disturbance during construction and operation. Damage, or permanent exclusion from setts.	If sett closure is required, requirements of the mitigation licence conditions will guide the need for sett creation, landscape planting and other mitigation. Mitigation would include habitat enhancement and compensation; offsetting habitat loss. If a main sett would be lost, provision of an artificial sett is required. Badger proof fencing and tunnels should be incorporated into the landscape design. Sett closure, vegetation clearance and earthworks to be supervised by a suitably experienced ecologist. Lighting and noise disturbance will be minimised through implementation of method statement.	Low	**Construction Phase:** Fragmentation of habitat due to vegetation clearance, lighting and noise disturbance. Potential for disturbance. Potential for sett closure and destruction. Minor Adverse. **Operational Phase:** Potential for disturbance. Minor Adverse.	Slight Adverse (construction and operation).
	Otters	No adverse effects anticipated.	Working methodology in accordance with CIRIA C532: Control of Water Pollution from Construction Sites.	High	*No change for both construction and operational phase.*	Neutral (construction and operation).
	Water vole	No adverse effects anticipated.	Working methodology in accordance with CIRIA C532: Control of Water Pollution from Construction Sites.	Medium	*No change for both construction and operational phase.*	Neutral (construction and operation).
	Great Crested Newts (GCN)	Loss of terrestrial GCN habitat. Vegetation clearance resulting in the disturbance or direct injury/death of GCN.	If GCN are found, requirements of the EPS licence conditions will guide the landscape planting and other mitigation. Mitigation would include habitat enhancement and compensation; offsetting habitat loss.	High	**Construction Phase:** Loss and fragmentation of habitat due to vegetation clearance, lighting and noise disturbance. Potential for disturbance.	Slight Adverse (construction and operation).

Receptor		Summary of effects	Mitigation	Sensitivity	Magnitude (with mitigation)	Overall significance of effect with Mitigation
		Noise, vibration and light (if night works) disturbance during construction and operation.	Translocation of GCN, between 30 and 60 days for a small/medium population. Landscaping design will provide additional habitat for GCN to forage and commute within. Vegetation clearance and earthworks to be supervised by a suitably experienced ecologist. Population monitoring surveys.		Potential for injury and even death. Minor Adverse. **Operational Phase:** Minor Adverse.	
	Reptiles	Potential to cause noise, vibration and light (if night works) disturbance during construction. Habitat loss. Potential to kill and injure reptiles during earthworks and vegetation clearance.	Sensitive working methods, possible translocation to a receptor site and ecological supervision. Landscaping would provide replacement habitat.	Medium	**Construction Phase:** Habitat loss and potential for killing and injury Minor Adverse. **Operational Phase:** Negligible adverse.	Neutral to Slight Adverse (construction). Neutral to Slight Adverse (operation).
	Invertebrates	Loss of low quality terrestrial habitat. Potential for pollution incidents, infilling and earthworks creates potential for change in sediment dynamics to impact on the flora and invertebrate community due to hydrological links. Potential for ditch to be realigned.	Both terrestrial and aquatic Invertebrate surveys required to assess impact and inform appropriate mitigation: could include translocation of invertebrates. New ditch design / existing ditches enhanced for biodiversity. Species rich grassland, hedgerows and woodland incorporated into the landscape design, would be of benefit to invertebrate species.	Medium	**Construction Phase:** Direct impacts due to construction activities on ditches. Loss of habitat. Minor Adverse. **Operational Phase:** Potential for pollution events and siltation. Negligible Adverse.	Slight Adverse (construction). Neutral to Slight Adverse (operation).

8.11 Enhancement measures

8.11.1 In accordance with the NPSNN, works should not only avoid or mitigate ecological effects, but also seek to compensate and enhance biodiversity within the area. Therefore, compensation and enhancement measures for the scheme should be implemented. 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 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. Enhancement measures will be developed in full and detailed as part of the ES.

8.12 Monitoring requirements for significant adverse effects

8.12.1 The scheme is not anticipated to result in significant effects. Therefore, monitoring for significant adverse effects is not required. This will be updated as part of the ES.

8.13 Conclusions

8.13.1 A summary of the assessment presented within this report for ecological receptors for the scheme is presented in Table 8.6 above. The overall on-balance significance of effects on biodiversity is anticipated to be Slight Adverse for construction and Neutral for operation.

8.13.2 The overall significance of effects for each ecological receptor is reliant on the mitigation measures within section 8.9 being implemented. Much of the mitigation for the operational phase is dependent on appropriate habitat enhancement and creation being included in the environmental master plan. Whilst no significant effects have been identified, further assessment work to calculate the area (m^2) loss of each habitat, and the habitat areas gained through mitigation will be undertaken to provide further confidence to the assessment of overall effect. These results will be presented as part of the biodiversity assessment to be included within the ES, which will reconfirm the significance of effect for biodiversity.

9 Geology and soils

9.1 Introduction

9.1.1 This chapter presents the on-going work for the assessment of the potential effects associated with the scheme upon geology and soils, including contaminated land and mineral resources.

9.1.2 The assessment has been undertaken in accordance with the Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 11, Geology and Soils. Further detailed assessment is currently under way, and will be reported within the Environmental Statement (ES) that will be submitted to support the Development Consent Order (DCO) application.

9.1.3 The key objectives of this chapter are:

- To identify the geology and soils (including contaminated land and mineral resources) factors to be taken into account during design in developing and defining the scheme during the construction phase
- To address any potential effects identified at the Scoping level

9.1.4 The effects of the scheme upon agricultural land have been assessed in chapter 12 People and Communities and are not considered in detail in this chapter.

9.2 Legislation and policy context

Environmental Protection Act 1990

9.2.1 The primary legislative regime under which historical contaminated land is managed in the UK is Part IIA of the Environmental Protection Act (EPA). Part IIA principally deals with sites where individual historical 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. The Part IIA clean-up is the minimum which can be done on a cost basis to make and keep the site in a just safe condition for an existing use.

Contaminated Land (England) Regulations 2006 (as amended)

9.2.2 The Contaminated Land (England) Regulations set out provisions relating to the identification and remediation of contaminated land under Part IIA of the EPA. The Regulations make provision for an additional description of contaminated land that is required to be designated as a special site where the Environment Agency is to be the enforcing authority.

Water Resources Act 1991

9.2.3 Under the Water Resources Act (WRA) 1991, risks from historical groundwater pollution can be considered under Section 161. This 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. The WRA and WRA 1991 (amendment) (England and Wales) Regulations 2009, Section 93, provides for the establishment of water protection zones. The regulations are implemented through the definition of Source Protection Zones (SPZs), within which the Environment Agency seeks to restrict certain potentially polluting activities.

Wildlife and Countryside Act (WCA) 1981 (as amended)

9.2.4 Geological and geomorphological features considered to be of national importance are designated as Sites of Special Scientific Interest (SSSI). They have some legal protection under the WCA against operations which may damage their interest. The WCA provides statutory protection to SSSIs in England. SPAs and Ramsar Sites, as well as limestone pavements, are also protected under this Act. Environmentally Sensitive Areas (ESAs) are agricultural areas benefiting from special protection. The importance of nature conservation, including areas with geological features, is also emphasised in the EPA.

Environmental Permitting (England and Wales) Regulations, 2016

9.2.5 The prevention of pollution is regulated by several pieces of legislation including the Environmental Permitting Regulations, which regulate pollution control by requiring permits for emissions to, for example, air and water.

Waste legislation

9.2.6 There are also a number of waste-related regulations which serve to protect soils from contamination by waste management, such as the Hazardous Waste (England and Wales) Regulations 2005 (as amended), Environmental Protection (Duty of care) Regulations 1991, Waste Management Licensing Regulations 1994 (as amended), Landfill Directive 1999, Landfill Tax (Contaminated land) Order 1996 and Landfill (England and Wales) Regulations 2002 (as amended) and the Waste (England and Wales) Regulations 2011 (as amended).

Other regulations

9.2.7 Under the Control of Substances Hazardous to Health Regulations 2002 (COSHH) and the Construction Design and Management (CDM) Regulations 2015, where a developer knows or suspects the presence of contaminated soil, provision will be made to ensure that risks to the public and site workers are minimised.

National Policy Statement for National Networks

9.2.8 In the context of this assessment, the National Policy Statement for National Networks[62] (NPSNN) states the following:

9.2.9 "*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*."

9.2.10 "*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…The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests.*"

9.2.11 "*Development should avoid significant harm to biodiversity and geological conservation interests, including through mitigation and consideration of reasonable alternatives.*"

Contaminated land guidance documents

9.2.12 The framework for the assessment of potential land contamination is based on current guidance documents regarding the implementation of Part IIA of the EPA and the assessment of potentially contaminated land, with particular reference to:

- Environmental Protection Act 1990: Part 2A, Contaminated Land Statutory Guidance[63]
- Human Health Toxicological Assessment of Contaminants in Soil[64]
- Updated technical background to the Contaminated Land Exposure Assessment (CLEA) Model[65]
- BS 10175:2011+A1:2013, Investigation of Potentially Contaminated Sites. Code of Practice[66]

[62] 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 August 2017).
[63] Defra (2012) Environmental Protection Act 1990: Part 2A, Contaminated Land Statutory Guidance.
[64] Environment Agency (2009) Human Health Toxicological Assessment of Contaminants in Soil, Report ref. SC050021/SR2 [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/291014/scho0508bnqw-e-e.pdf (last accessed July 2017).
[65] Environment Agency (2009) Updated technical background to the CLEA Model, Report ref. SC050021/SR3 [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/291014/scho0508bnqw-e-e.pdf (last accessed July 2017).
[66] British Standard (2013) BS 10175:2011+A1:2013, Investigation of Potentially Contaminated Sites. Code of Practice.

- BS 8485:2015, Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings[67];
- Groundwater protection guides covering: requirements, permissions, risk assessments and controls (previously covered in GP3)[68]
- Model Procedures for the Management of Contaminated Land, Contaminated Land Report 11 (CLR11)[69]

9.3 Assessment methodology

9.3.1 Assessment methodology for defining the significance of effects upon geology and soils is contained within section 9.10 of the Environmental Impact Assessment Scoping Report submitted to the Planning Inspectorate in November 2017. The Scoping Report can be accessed here:

9.3.2 https://infrastructure.planninginspectorate.gov.uk/projects/south-west/a303-sparkford-to-ilchester/?ipcsection=docs.

9.4 Study area

9.4.1 In general, the study area for this assessment considers features within 500 metres of the scheme, however for hydrogeological and hydrological features with the potential for further reaching impacts, a wider area is considered to be more appropriate. For example, where there are features that may be affected by pollutants transported downstream of the works, these features would be included in the assessment as appropriate. Additionally, for groundwater the potential zone of impact during construction and operation phases will be assessed on the underlying Water Framework Directive (WFD) groundwater body.

9.4.2 The sensitivity (value) of these resources / receptors has then been determined using the methodology previously outlined and the magnitude of change (impact) evaluated to determine a significance category for the effect. This has enabled the overall significance of each effect within the study area to be predicted.

9.5 Existing baseline

9.5.1 Area-wide baseline conditions are discussed initially, followed by a detailed review of those conditions relating to the scheme contained within Table 9.1 (including chainage-specific baseline data where relevant).

[67] British Standard (2015) BS 8485:2015, Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings.
[68] Environment Agency (2017) Groundwater protection guides covering: requirements, permissions, risk assessments and controls (previously covered in GP3) [online] available at: https://www.gov.uk/government/collections/groundwater-protection (last accessed July 2017).
[69] Environment Agency (2004) Model Procedures for the Management of Contaminated Land, Contaminated Land Report 11 (CLR11) [online] available at: http://www.eugris.info/displayresource.aspx?r=4023 (last accessed June 2017).

9.5.2 Throughout this section, reference is made to numerous geology and soil features located in the vicinity of the scheme, the majority of which are shown on the environmental constraints plan contained within appendix A.1.

Area-wide baseline conditions

Geographical setting

9.5.3 The area is dominated by the east-west trending ridge of Camel Hill formed by the relatively resistant beds of the White Lias and the Blue Lias. Surrounding Camel Hill are the relatively flat, low lying Vales of Sparkford and Ilchester[70].

Geological setting

Superficial deposits

9.5.4 According to BGS mapping[71,72], superficial deposits located along the scheme are limited. A broad east-west trending ribbon of alluvium (clay, silt, sand and gravel) is present to the north of the existing A303. BGS boreholes record alluvium (as well as 'Taele Gravel') at approximate chainage 1200 metres.

9.5.5 A small area of River Terrace deposits (sand and gravel) is shown 500 metres west of Sparkford on BGS mapping. This is indicated to underlie the easternmost section of the scheme (less than 0.5 kilometres) at the existing dual-carriageway alignment.

9.5.6 River Terrace deposits are also indicated to be present at Podimore, extending some 300 metres to the east of the settlement and south of the existing A303 and it is possible they may be encountered during construction.

Solid geology

9.5.7 BGS mapping[71,72], indicates the area is principally underlain by solid strata of the Langport Member, Blue Lias Formation and the Charmouth Mudstone Formation (undifferentiated), of the Lias Group consisting of mudstones (previously referred to as the Lower Lias):

- The Langport Member (previously referred to as the Langport Beds or the White Lias) comprises a series of tough cream and buff calcite mudstones with thin interbedded pale grey and buff marls anticipated to be ~6.4m in thickness at Sparkford

[70] OS Explorer (2015) *1:25,000 Scale Sheet 129: Yeovil and Sherborne – Somerton and Wincanton*. ISBN 9780319243251.
[71] British Geological Survey (1973) Geological Survey of England and Wales 1:63, 360/1:500,000 geological map series, New Series p(Sheet number 296 – Glastonbury), 1:50,000 scale, Solid and Drift [online] available at: http://www.bgs.ac.uk/data/maps/maps.cfc?method=viewRecord&mapId=10187 (last accessed August 2017).
[72] British Geological Survey (2017) Online viewer – bedrock and superficial geology and borehole search functions [online] available at: http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html (last accessed May 2017)

- The overlying Blue Lias comprises an interbedded sequence of grey and blue-grey limestones and mudstones / shales. At Camel Hill, the Blue Lias is anticipated to be ~7.6m in thickness
- The Charmouth Mudstone Formation comprises dark grey laminated shales, and dark, pale and bluish grey mudstones with locally concretionary and tabular limestone beds and abundant argillaceous limestone, phosphatic or ironstone nodules in some areas.

9.5.8 The BGS[73] note that much of the Lias has high pyrite and sulphate content.

9.5.9 In the vicinity of Camel Hill, the A303 is crossed by a small inlier of undifferentiated interbedded mudstone and limestone of the Westbury Formation and the Cotham Member of the Penarth Group (previously known as the Rhaetic Beds). The inlier is bounded to the southern side by an east-west trending normal fault (Camel Hill Fault) which passes beneath the scheme, down-throwing the strata to the south by an unspecified amount.

9.5.10 The regional inclination of strata is variable across the scheme, but broadly inclined to the north.

Anticipated strata

9.5.11 The following general sequence of deposits exists in the vicinity of the scheme:

- Topsoil / Made Ground
- River Terrace Deposits (near Podimore and Sparkford)
- Lower Lias Clay / Mudstone / Siltstone / Limestone
- Blue Lias Clay / Mudstone / Limestone (at Camel Hill)
- White Lias Clay / Mudstone / Limestone (at Camel Hill)
- Westbury Formation and Cotham Member Limestone (at Camel Hill)

Coal mining and brine extraction

9.5.12 According to the Coal Authority Interactive Map Viewer[74], historic or current coal mine workings are not present on site. Brine excavation is not anticipated within the vicinity of the site based on the geology of the surrounding area.

Hydrogeology

Bedrock

9.5.13 According to Environment Agency online mapping[75], the bedrock geology present across the site (solid strata of the Langport Member, Blue Lias

[73] Hobbs, P.R.N., Entwisle, K.L., Northmore, K.J., Sumbler, M.G., Jones, L.D., Kemp, S., Self, S., Barron, M. and Meakin, J.L ((2012) Engineering Geology of British Rocks and Soils - Lias Group. British Geological Survey, 323pp. (OR/12/032) (unpublished) [online] available at: http://nora.nerc.ac.uk/17270/ (last accessed June 2017).
[74] Coal Authority (2017) Interactive Map Viewer [online] available at: http://mapapps2.bgs.ac.uk/coalauthority/home.html (last accessed July 2017).
[75] Environment Agency (2017) What's In Your Backyard online viewer [online] available at: http://apps.environment-agency.gov.uk/wiyby/search%20function (last accessed July 2017).

Formation and the Charmouth Mudstone Formation) is classed as a Secondary A Aquifer, defined as the presence of "*permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers*".

9.5.14 In the vicinity of Camel Hill, the interbedded mudstone and limestone of the Westbury Formation and the Cotham Member of the Penarth Group is classed as a Secondary B Aquifer, defined as "*lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering*".

9.5.15 No part of the scheme is located within a Groundwater SPZ, with the nearest Zone 2 (outer zone) located approximately 3.5 kilometres distant from Sparkford.

Superficial deposits

9.5.16 The overlying drift deposits, where present, are classified as a Secondary A Aquifer. These deposits, do not provide any groundwater resource but may contain localised groundwater that could become a consideration in terms of construction, dewatering and impacts on surface water bodies.

Abstractions

9.5.17 There are few abstraction boreholes in the area with only 2 abstraction licences recorded to the west of Sparkford dating back to 1967-70. It is not known if these abstractions are still active.

Hydrology

9.5.18 The scheme lies within the catchment of the River Cam to the south and the River Cary via Dyke Brook to the north. The River Cam runs approximately 500 metres south of the scheme in a roughly parallel direction to the west before it joins the River Yeo at a confluence near Yeovilton. Dyke Brook ranges from being around 1,200 to 1,650 metres north of the scheme where it flows to the west in a roughly parallel direction and meets with the River Cary.

Foot and mouth burial sites

9.5.19 Consultation has been undertaken with the Department for Environment Food and Rural Affairs (Defra) regarding the location of Foot and Mouth burial sites within the scheme area. The State Veterinary Service reported that there were no foot and mouth cases within the district and that the nearest burial site is to the west of Taunton.

Unexploded ordnance

9.5.20 An unexploded ordnance (UXO) pre-desk study assessment of the scheme has identified a likely low UXO hazard level. The report, full details of which will be included as part of the ES, refers to a WWII aircraft crash site at Camel Cross

(no further location details provided) and there is the potential that this may present constraints if encountered.

Table 9.1: Baseline data

Aspect	Details and chainage (where applicable)	
Geology	• There are approximately 80 No. relevant exploratory boreholes along the route of the existing A303, which provide information on the ground conditions. However, these are restricted to the westbound carriageway of the scheme and do not provide sufficient data along the eastbound section of the scheme.	
	0-200m	• Thin layer of topsoil up to 0.5m thick, underlain by firm to very stiff, grey clay. Some layers contain calcareous shells and concretions, occasional thin beds of slightly laminated mudstone (Lias Group).
	2,000 – 3,500m	• Topsoil around 0.3m thick overlying sand and gravel superficial deposits (River Terrace Deposits). Rockhead is recorded at a maximum of 8m bgl with stiff to very hard, grey, silty sometimes shelly clay. • The Camel Hill fault crosses the scheme at a chainage of approximately 3,200m with Westbury Formation and Cotham Member limestone beds 100m east of the fault line.
	3,500 – 5,000m	• Thin layer of superficial deposits to a max depth of 1.45m bgl, generally described as brown sand and gravel with Blue Lias Formation (limestone) proven to 15m bgl. • To the south of the road up to 1m thick River Terrace Deposits of gravel are recorded.
	5000 – 6000m	• Approximately 0.3m thickness of topsoil occasionally underlain by River Terrace Deposits of gravel to a maximum of 0.7m thick. Bedrock comprises Charmouth Mudstone Formation (of Lias Group).
Sites of geological interest	Historic Quarrying	• There are a number of historic quarries located in close proximity to the current A303 in the vicinity of Camel Hill although the closest lie to the south of the existing A303 alignment. Other than one used for landfilling purposes the presence or composition of any backfilled materials is unknown.
	Local geological Sites	There are 2 Local Geological Sites in close proximity to the scheme: • Camel Hill Quarry East – Hummocky area in woods located adjacent to the south of the existing A303 at approximate Ch. 4950 • Sparkford Hill Copse – Useful sections of Rhaetic Langport Beds in disused quarries in wood owned by the Sparkford Copse Trust located approximately 350m south-east of the existing A303 just west of the Hazlegrove Junction Roundabout
	BGS Recorded Mineral Sites	• There are a number of BGS Recorded Mineral Sites[76] in close proximity to the current A303 in the vicinity of Camel Hill. They predominantly relate to Camel Hill Farm and Ridge, Queen Camel for the excavation of Westbury Formation and Cotham Member (limestone) along with Langport Member, Blue Lias Formation and Charmouth Mudstone (limestone). Several of them coincide with the location of historic quarry sites.
Hydrology	Dyke Brook and the River Cam are fed by a number of springs that can be seen on the OS map of the area. Numerous springs are indicated on site mapping and a number of the fields have linear drainage ditches which appear to flow southwards. The scheme does not cross any major water courses however there are 8 existing culverts passing beneath the existing A303.	

[76] British Geological Survey (2017) Mineral resource maps in England and parts of north Wales [online] available at: https://www.bgs.ac.uk/mineralsuk/planning/resource.html (last accessed July 2017).

Aspect	Details and chainage (where applicable)
Soil survey	The MAGIC online map viewer[77] shows a map of the soil types present. Two different soil types are shown in the area. At Ch. 0-2,000m the soil is described as slightly acid, loamy and clayey soils with impeded drainage. From Ch. 2000m to the east, the soil is described as lime-rich loamy and clayey soils with impeded drainage. The Agricultural Land Classification is predominantly Grade 3.
Landfill records	Two landfills are located within 500m of the scheme: • Land Adjacent to Hazlegrove Park, which accepted inert and household waste from June 1989 to June 1990. The scheme crosses the southern boundary of the landfill at approximately Ch. 5650m • Camel Hill Quarry, which accepted inert and industrial waste from 29 November 1989 to 5 June 1992, which is located to the immediate south of the existing A303 at the approximate Ch. 5050m
Current land use and man-made features	The principal land use throughout the area of interest is agriculture including arable farming and pasture for dairy farming. The principal man-made feature in the vicinity is the existing highway network. Also important are the towns of Sparkford and Podimore at either end of the scheme and the numerous smaller settlements. An active Shell petrol station is located at approximate Ch. 4700m to the immediate south of the existing A303 while Steart Road Garage with associated underground fuel tanks is located in close proximity to the north of the scheme alignment at Ch. 3300. A filling station is also present south of Hazlegrove Roundabout, to the south of the scheme. Ministry of Defence (MOD) land with a visible array is present immediately to the south of the current A303 / proposed scheme alignment at approximate Ch. 4250m. Adjacent to the MOD site is an approximately 25m tall communication tower located 30m from the edge of the road. Made Ground has been encountered within boreholes to a maximum depth of 1.4m. The material is variable, generally described as sandy clay with fragments of brick, concrete and hardcore. Made ground is anticipated with the existing road construction, comprising asphalt over DoT Type 1 sub-base.
Area history	• The historical development of the area has been summarised from historical mapping contained within the Landmark Envirocheck Report. Historic mapping shows that the vicinity of the scheme has comprised generally agricultural land, wooded areas and orchards throughout its history and generally runs parallel to the line of historic roads / lanes prior to the construction of the current A303 (~1979) and junctions including Hazlegrove Roundabout to the east. • On the earliest mapping (1886), several quarries were indicated to the north and south of the eastern half of the scheme. However, the majority of these were no longer marked by 1904 mapping suggesting abandonment / infilling. The quarry to the north of Gason Lane was only marked as disused on 1982 mapping suggesting a longer active period. • The filling station to the south of the existing A303 at Ch. 4700 was first marked on 1975 mapping. A garage was also shown to the south of the road at Camel Cross Ch. 2050m on 1975 mapping, however the site is now in use as a B&B and restaurant. The garage at Steart Road was also first indicated on 1975 mapping. • The MOD land (understood to be a signalling station) to the immediate south of the A303 Ch. 4250m was first identified on 1962 mapping (although unlabelled, its exact date of construction between 1904-1962 is unknown). • Over time, the surrounding settlements have grown and the number of mapped ponds and springs in the vicinity has risen.
Potential contamination risks	• Infilled historic quarries containing potentially unknown fill present potential soil and groundwater contamination risks. • Historic and current fuel stations / garages with underground tanks adjacent to scheme. • Eastern end of scheme passes over existing landfill site known as Land Adjacent to Hazlegrove Park and the landfill site known as Camel Hill Quarry is located in close proximity to the south. Both are potential sources of contaminated soils, landfill leachate and landfill gas. • Presence of made ground from the construction of the existing A303 and isolated commercial / residential / agricultural uses. • Details of the MOD site present directly next to the existing A303 at Ch. 4250 are unknown. Hazard signs for asbestos are displayed, possibly forming the roofs of the older buildings on the site. • A historic saw pit is identified at Chainage 5175m.

9.6 Value (sensitivity of resources and receptors)

9.6.1 Using Table 9.1, each principal receptor identified has been assigned a sensitivity, with reasoning as provided within Table 9.2.

[77] Defra (2017) MAGIC Online Map [online] available at: http://magic.defra.gov.uk/ (last accessed May 2017).

Table 9.2: Sensitivity of principal receptors

Receptor	Receptor sensitivity	Reasoning
Geology – superficial deposits of resource value	Low	According to BGS mapping, superficial deposits are present in the northern central section (Alluvium) and to the far east (River Terrace Deposits). However, intrusive ground investigations (GI) has shown generally limited thicknesses to be present elsewhere.
Geology – local geological sites	Medium	Present to the immediate south of the existing A303.
Soils - natural	Medium	The scheme would cross predominantly ALC Grade 3 land.
Soils – made ground	Negligible	Urban Classified Soil.
Surface water	Medium	Numerous springs, drainage ditches and small surface water courses are present in the vicinity of the scheme. The River Cam is classed as a Main River while Dyke Brook is understood to be an Ordinary Watercourse.
Groundwater	Medium	Superficial and bedrock geology predominantly forms a Secondary A Aquifer with areas of Secondary B.
Human receptors	Low	Highway development is considered to be a low sensitivity land use.
Built environment	Low	Final end use is of low sensitivity (infrastructure).
Site flora (future landscaping and grassed areas)	Low	Future landscaped areas will require regular maintenance and will have generally low ecological value.
Mineral resources	Medium	River Terrace Deposits and Alluvium.

9.7 Consultation

9.7.1 Initial consultation with the Environment Agency has been progressed through the key stakeholder engagement exercises, as detailed within section 2.7. However, specific consultation with the Environment Agency will be necessary to discuss the impact of the scheme on the landfill sites identified and vice versa. Other scheme aspects will also need to be discussed. A meeting was held with the Environment Agency on the 4 July 2017 and a further meeting on 7 December 2017, although this primarily focussed on flooding and water quality issues, rather than the historic landfills along the scheme.

9.8 Assumptions and limitations

9.8.1 The baseline information on the scheme has been based on a desk study of currently available information at the time of writing.

9.8.2 A GI will need to be carried out to confirm the ground conditions in the vicinity of the scheme and establish whether any contamination is present in near surface soils.

9.9 Design and mitigation measures

Construction

9.9.1 The following general measures should be adopted during the construction stage to minimise effects upon geology, soils and contaminated land.

Construction Environmental Management Plan

9.9.2 All construction works should be carried out in accordance with a Construction Environmental Management Plan (CEMP) detailing the reasonable and practicable steps to be undertaken to prevent pollution of the surrounding environment including site soils, groundwaters and surface waters.

Protection of soil structure and quality

9.9.3 Topsoils and subsoils should be stripped first, segregated and stockpiled appropriately for re-use across the site where practicable. Where re-use on-site is not possible for all soils, alternative sites in close proximity should be prioritised.

9.9.4 Other possible mitigation measures may include (but not be limited to) the use of a proprietary geotextile membrane to protect the existing ground condition, a layer of inert crushed granular material on the membrane to form temporary running surfaces for construction plant and reinforcement of access tracks.

9.9.5 The inclusion of a Soil Management Plan (SMP) within the CEMP would ensure works are undertaken in accordance with appropriate guidelines such as Defra's 2009 'Code of Practice for the Sustainable Use of Soils on Construction Sites' and BS2882: 2015 'Specification for Topsoil' particularly in areas where reinstatement of agricultural land will be required.

Minimisation of waste generation

9.9.6 Where major earthworks are required a cut and fill balance should be aimed for, however surplus soils may be suitable for re-use elsewhere on the scheme depending on testing of the soils and providing the results fall within defined acceptability criteria.

9.9.7 The scheme would cross a relatively limited area of River Terrace Gravels and potentially Alluvium, although additional un-mapped deposits may be encountered. Therefore, where practicable the re-use of excavated gravels across the site or of excess materials on nearby sites should be promoted to minimise the volume of resource sterilised. Appropriate mass balance calculations, a robust Materials Management Plan (MMP), a Site Waste Management Plan (SWMP) and compliance with the CL:AIRE document 'The Definition of Waste: Development Industry Code of Practice Version 2 (2011)' will help to maximise the re-use of suitable geological resources while minimising waste generated.

9.9.8 The earthworks specification should provide geotechnical and chemical acceptability criteria to which site won and imported materials would comply before being used during construction.

Dust suppression

9.9.9 Dust suppression using best practice methods would also assist in the prevention of the spread of potentially contaminated windblown material. The

CEMP should include detailed measures relating to dust suppression. Dust Suppression is also addressed in chapter 5 Air Quality.

Protection of controlled waters: general

9.9.10 Excavated materials should be managed in line with best practice guidance. Stockpiles should be located away from watercourses and there should be clear segregation of materials with dust suppression measures and covers for stockpiles as necessary.

9.9.11 The CEMP will prevent the pollution of the local environment by addressing construction methods and ensuring they are adopted into the works including an auditing programme to verify environmental performance. Furthermore, it is recommended that the works are monitored by a suitably qualified Site Environmental Engineer / Environmental Manager, to be responsible in identifying and approving all methods of pollution control.

9.9.12 Cut-off ditches would be used to collect site run-off, where practicable, with run-off passed through a settling lagoon to allow removal of sediments prior to discharge.

9.9.13 Since portions of the exploratory works would be undertaken over a Secondary A Aquifer there is a risk that the boreholes would create vertical pollution pathways to that aquifer. To prevent the contamination of the aquifer the Contractor must take precautions, in line with all associated pollution prevention guidelines and best practice, to ensure that pollution of the aquifer cannot occur and new pathways for contaminant migration are not established when working in areas where Made Ground or landfilled materials are present.

Protection of controlled waters: foundation works

9.9.14 Where piling or penetrative ground improvement is required through potentially contaminated ground into aquifers, the works should be carried out in accordance with the Environment Agency publication (2002) Piling into contaminated sites and (2001) Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention" (National Groundwater & Contaminated Land Centre report NC/99/73). A Foundation Works Risk Assessment may need to be undertaken to determine the potential likely effects relating to the driving of piles through any contaminated made ground / landfilled materials and into the underlying Secondary A Aquifer, and to identify what mitigation measures are appropriate for the site.

9.9.15 The pouring of concrete in close proximity to surface water features could result in associated pollution entering the groundwater body. Therefore, appropriate measures should be included within the contractor's method statement for the protection of the environment, such as the placement of temporary bunds down-slope to contain any spillages, and the development of a spill response protocol.

9.9.16 The discharge of potentially contaminated groundwater should be appropriately managed.

Management of construction plant and materials

9.9.17 The storage of oil, fuel and other potentially hazardous substances should be within a secure site compound located on a hardstanding area. Storage of these substances should be within an appropriately bunded area (110% of total capacity volume). There should be a designated refuelling and maintenance area. Regular inspections of site plant should be carried out and the use of drip trays and training in the location and use of spill kits and emergency spillage procedures should be provided for site workers (via tool box talks or similar). Wheel washing facilities should be utilised to prevent transfer of site soils to adjacent roads and best practice dust suppression methods should be employed on-site to prevent soil erosion. Adjacent areas outside the development boundary should be protected to prevent accidental encroachment and damage of topsoil.

Excavations and dewatering

9.9.18 Excavations below ground level may require dewatering of run-off waters/perched waters/groundwaters from the Superficial Secondary Aquifer. This water should be appropriately managed on-site. Pumping the water to a settling lagoon to remove suspended solids would be advisable. Discharge to ground/surface waters will need an appropriate Environmental Permit from the Environment Agency or a Discharge Consent from the local public sewerage services provider for discharges to sewer. If contamination is present / suspected on-site treatment or off-site disposal may be required.

Management of contamination risks

9.9.19 A Contaminated Land Risk Assessment (CLRA) will be required to inform the GI (to be completed prior to the GI scope being finalised), with the geo-environmental scope to be agreed with the Local Authority Contaminated Land Officer and the Environment Agency.

9.9.20 The GI should include the collection of soil and groundwater samples for laboratory analysis to enable assessment of risks from contamination to human, environmental and structural / utilities receptors along with waste classification.

9.9.21 At the earliest opportunity following the GI a Quantitative Risk Assessment (either Generic or Detailed as influenced by the GI findings) and Remediation Strategy should be completed which, along with geotechnical assessment will inform the final scheme design. The Remediation Strategy will manage all identified risks and ensure that the scheme does not result in the creation of additional contamination transport pathways.

9.9.22 In addition, the following measures should be implemented to mitigate risks associated with contaminated waste:

- Hazardous substances such as excavated contaminated land, fuels, chemicals, waste and construction materials should be stored, handled, transported and disposed of in accordance with the CEMP and SWMP

- It is the responsibility of the producer to ensure that all waste created on site undergoes basic characterisation prior to disposal to an appropriate landfill. To ensure on-site waste management is in line with best practice and the Waste Hierarchy the following should be implemented:
  - Full characterisation of soil and macadam samples in accordance with the Environment Agency's Guidance on the Classification and Assessment of Waste[78]
  - Once waste characterisation has been undertaken, Waste Acceptance Criteria testing (WAC) (where necessary) to establish the acceptability of hazardous, hazardous non-reactive and inert wastes for landfill disposal. Every effort should be made to minimise waste to be landfilled with treatment at an appropriate facility considered in the first instance

9.9.23 Due to the nature of their work construction and maintenance workers are likely to ingest, inhale, or come into dermal contact with any potentially contaminated soils / waters / gases if present. Construction and maintenance workers may also be at risk from exposure to ground gas, particularly when undertaking works in excavations and confined spaces. Risks to construction and maintenance works can be mitigated through risk assessments undertaken by the Contractor specific to the works in order to identify risks and appropriate mitigation measures in line with all relevant health and safety legislation and guidance. These are likely to include (but not be limited to) appropriate provision of personal protective equipment (PPE), appropriate hygiene facilities and ventilation with gas detection monitoring in confined spaces.

Works in areas of historic landfills, infilled quarries or made ground

9.9.24 Based on assessment of historical mapping, Environment Agency and Local Authority records, it is anticipated that works would be undertaken across a historic landfill and potentially crossing limited areas of backfilled quarries. A CLRA should be undertaken to determine the nature of the material and quantify the risks posed to receptors.

9.9.25 Confirmation of requirements would be sought from the Environment Agency during planning of the GI and subsequent construction works, but they are likely to include aquifer protection measures such as casing through any backfilled materials, recirculation or safe containment of drilling flush, plugging/reinstatement of landfill linings and of capping materials if encountered.

9.9.26 Landfill material has the potential to produce ground gases. There is the potential for construction works to alter the existing ground gas regime in some areas and/or the possibility that site operations and construction staff may be at

[78] Environment Agency (2015) Waste Classification – Guidance on the classification and assessment of waste (1st Edition): Technical Guidance [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/427077/LIT_10121.pdf (last accessed July 2017).

risk from the presence of ground gases. These risks should be assessed in accordance with current guidance.

Operation

9.9.27 The completed and operational scheme is not expected to result in any adverse effects on geology or soils. As a result, no mitigation is suggested and no further assessment of operational stage effects will be undertaken for the scheme.

9.10 Assessment of effects

Construction phase

9.10.1 The scheme would include a range of construction activities which have the potential to result in adverse effects on geology and soils. Principal construction activities are anticipated to include:

- Shallow excavation works – Resulting in the permanent removal of shallow deposits (soils, made ground and superficial deposits), potential for contaminated materials to be disturbed
- Earthworks – Resulting in waste generation and disturbance of groundwaters, generation of excavations which will require dewatering, and ground / landfill gas risks
- General construction works – The movement of materials, construction plant and storage of materials may lead to compaction of agricultural soils and the storage of hazardous chemicals leading to secondary effects on soils and groundwater
- Foundation Works – Piling or penetrative ground improvement as part of foundation construction may pose risks to controlled waters along with environmental risks relating to the use of concrete in construction

9.10.2 Table 9.3 summarises the assessment of effects, detailing the potential effect identified and appropriate mitigation measure for a particular receptor. The receptor sensitivity and magnitude of impact has estimated followed by the identification of the significance category after mitigation, as detailed in section 9.9 above.

Table 9.3: Assessment of effects

Receptor	Summary of effects	Mitigation measures	Action by	Receptor sensitivity	Magnitude	Significance category (with mitigation)
Geology	Potential for permanent removal / sterilisation of Superficial Deposits (and their future use as a potential resource during site construction). Alluvium and River Terrace Deposits (although unmapped deposits are also known to be present).	• Minimisation of waste generation	Contractor	Medium	Minor (impact on a moderate volume of geological material).	Neutral – Slight Adverse
	Potential for impacts on Local Geological Sites.	• None required as scheme does not intersect. Potential for enhancement (see section 9.12).	Contractor	Medium	No change.	Slight Beneficial
Geology/ Soils	Potential for excess material to be generated requiring off-site disposal/transport and re-use with associated waste/carbon generation impacts.	• Minimisation of waste generation	Contractor	Medium	Moderate (generation of material for off-site disposal).	Slight Adverse
Soils	Potential for permanent removal of high quality site soils during site construction.	• Minimisation of waste generation • Protection of soil structure and quality • Management of contamination risks	Contractor	Medium	Moderate (removal of a moderate area of soils).	Slight Adverse
	Soil deterioration and consolidation may occur due to poor storage and handling or due to vehicle movements and loading.					
	Potential for removal/remediation of any areas of contaminated soils identified.		Designer (GI) / Contractor (site work)	Negligible	Minor (remediation/improvement of a minor area of soil).	Neutral / Slight Beneficial
Surface Water	Potential for surface water run-off to become entrained with sediment and pollute nearby watercourses.	• CEMP • Protection of Controlled Waters: General • Excavations and dewatering • Management of contamination risks • Protection of controlled waters: foundation works • Works in Areas of Historic Landfills, Infilled Quarries or Made Ground	Contractor	Medium	Minor - Moderate (dependent on extent of pollution and change in chemical quality - EQSs)	Neutral – Slight Adverse
	Discharge of potentially contaminated / sediment laden groundwater to watercourses following dewatering of excavations / foundation works.					
	Concrete spillages entering local drainage ditches.					
Groundwater	Potential for creation of contamination pathways / driving down of contaminants during GI / foundation works, presenting a risk to groundwater.		Designer (GI) / contractor (site work)	Medium	Minor - Moderate (dependent on extent of pollution and change in chemical quality - DWSs)	Neutral – Slight Adverse
	Increased turbidity within the aquifer due to GI / foundation construction operations.					
	Injection of grouts or pastes into groundwater during foundation works potentially leading to quality deterioration.					

Receptor	Summary of effects	Mitigation measures	Action by	Receptor sensitivity	Magnitude	Significance category (with mitigation)
Human receptors	Contact of construction and maintenance workers with potentially contaminated soils / leachates / ground gases.	• Management of contamination risks	Contractor	Medium	Minor - Moderate (dependent on characteristics of contamination and exposure period)	Neutral
	Effects on final end users are considered to be very limited given the nature of the proposed use as a highway.		Designer (GI) / Contractor (site work)	Low	Negligible	Neutral
Buildings, structures and utilities	Potential for degradation of construction materials e.g. concrete and pipe materials in areas of contamination or natural high sulphate content.	• Management of contamination risks	Designer	Low	Minor - Moderate (depending on exact chemical conditions encountered)	Neutral
Flora	Potential for impairment of landscape and grassland re-development. While the linear areas to be re-vegetated after construction are considered to be of low ecological potential, if the soil chemical composition is not suitable for vegetation establishment the strips of land may be left vulnerable to erosion.	• Management of contamination risks	Contractor	Low	Minor - Moderate (depending on extent of damage to soil structure and chemical composition)	Neutral / Slight Adverse
Multiple	Potential contamination of soils, groundwater and surface water through contaminant mobilisation during excavation or remediation activities, particularly in vicinity of historic landfills and former (potentially infilled) quarries.	• CEMP • Protection of soil structure and quality • Dust suppression • Protection of controlled waters: general • Excavations and dewatering • Management of contamination risks • Works in areas of historic landfills, infilled quarries or made ground.	Contractor	Medium	Minor - Moderate (depending on specific site activities and nature of landfilled materials / made ground)	Neutral / Slight Adverse
	Potential contamination of soils, groundwater and surface water through accidental spills and leaks relating to construction plant and fuels / oils.					

9.11 Monitoring requirements for significant adverse effects

9.11.1 Incorporating the mitigation measures as outlined in section 9.9, the maximum residual effect identified is Slight Adverse. Therefore, no effects are considered to be significant. However, the scheme would pass over an area of historic landfill to the far east, north of Hazlegrove Roundabout. The requirement for monitoring will be discussed with the relevant consultation bodies. Monitoring requirements should be included within the Contaminated Land reporting for the site.

9.12 Enhancement measures

9.12.1 The removal / remediation of any areas of contaminated soils would result in a slight beneficial effect from the scheme.

9.12.2 There are limited opportunities for additional enhancement in relation to geology and soils for the scheme given the nature of the development. However, the presence of Local Geological Sites adjacent to the scheme may present an opportunity for the provision of improvements to these sites, should they be affected in any way. For example, the provision of public information boards in consultation with local geological groups at Camel Hill Quarry East to provide background on the geology and history of the site, or boundary / safety improvements may be an option. These opportunities will be explored as part of the ongoing environmental assessment in advance of the DCO application.

9.13 Conclusions

9.13.1 This chapter has provided an assessment of the potential effects of the scheme on geology and soils. The site baseline has been summarised and an assessment of potential effects completed with subsequent mitigation measures identified.

9.13.2 It is considered that the scheme has the potential to result in adverse effects upon geology, soils and the associated environment during construction, such as the potential for:

- 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 – for example, relating to discharges of sediment laden groundwaters, entrainment of sediments in surface waters and foundation works increasing turbidity
- Encountering contaminated materials within landfills / made ground, mobilisation of contaminants and generation of contaminant transport pathways from site activities
- Removal / remediation of any areas of contaminated soils identified (beneficial effect)
- Effects on construction workers relating to contact with, for example, contaminated materials and landfill gases

- Impairment of landscape and grassland re-development.

9.13.3 However, a number of measures have been highlighted as being suitable for mitigating the effects identified above, which include measures designed to:

- Protect soil structure and quality
- Minimise waste generation
- Protect controlled waters from both general site works and foundation works
- Manage construction plant and materials
- Manage excavations and dewatering

9.13.4 Recommendations are also provided to manage risks from contaminated land and works in areas of historic landfills/infilled land.

9.13.5 Where necessary, further work required has been identified both in relation to contaminated land investigation and reporting, and in relation to required construction documents such as the CLRA, CEMP, SWMP, MMP and SMP.

9.13.6 In summary, with the inclusion of appropriate mitigation measures, construction stage effects on identified geology and soils receptors are not considered to be significant for the scheme. However, it is considered necessary to undertake further assessment to DMRB Simple level which will incorporate the results of additional surveys including GI. This assessment will be reported within the ES, to be submitted as part of the DCO application.

9.13.7 The completed and operational scheme is not expected to result in any significant adverse effects on geology or soils, and this will therefore be scoped out of the ES.

10 Materials

10.1 Introduction

10.1.1 This chapter presents the on-going work for the assessment of the potential effects on material assets as a result of the scheme, that has been undertaken to date. The assessment presented in this chapter concentrates on the use of primary, secondary, recycled, and manufactured materials, and the generation and management of waste.

10.1.2 The assessment has been undertaken in accordance with guidance provided by Highways England in the Design Manual for Roads and Bridges (DMRB) Volume 11, Section 2, Part 5 Assessment and Management of Environmental Effects (HD 205/08)[79]. Further detailed assessment is currently under way, and will be reported within the Environmental Statement (ES) that will be submitted to support the Development Consent Order (DCO) application.

10.1.3 For the purposes of the assessment, materials are defined as comprising:

- The use of material resources
- The generation and management of waste

10.1.4 The Environmental Impact Assessment Scoping Report (November 2017) highlighted the potential for significant effects on material assets during the construction phase, although the operational phase of the scheme has been scoped out of further assessment, as it is anticipated that there would be minimal requirement for material resources and minimal waste generation, besides infrequent maintenance activities, and as such, no operational stage assessment has been undertaken within this report.

10.2 Legislation and policy context

National legislation and policy

10.2.1 A wide range of legislation, policies and guidance that regulate the control and management of waste have been considered. The key legislation and policies relevant to the scheme include the following:

- Landfill Directive, 1999/31/EC
- Revised Waste Framework Directive, 2008/98/EC
- Environmental Protection Act 1990
- Clean Neighbourhoods and Environment Act 2005
- National Networks National Policy Statement (2014)
- National Planning Policy for Waste 2014
- National Planning Policy Framework (NPPF) 2012

[79] Highways Agency (2008) Design Manual for Roads and Bridges (DMRB) Volume 11, Section 2, Part 5 Assessment and Management of Environmental Effects (HD 205/08) [online] available online at: http://www.standardsforhighways.co.uk/ha/standards/dmrb/vol11/section2/ha20508.pdf (last accessed March 2017).

- Environmental Permitting (England and Wales) Regulations 2010, as amended
- The Waste (England and Wales) Regulations 2011, as amended
- Hazardous Waste (England and Wales) Regulations 2005, as amended
- The List of Waste Regulations 2005
- The Landfill (England and Wales) Regulations 2002, as amended
- The Landfill Tax (England and Wales) Regulations 2016, as amended
- The Aggregates Levy (General) Regulations 2002, as amended
- The Finance Act 1996, as amended
- Waste Management Plan for England 2013
- The Waste Prevention Programme for England 2013

10.2.2 The key policy and legislation has been summarised below.

The Waste Framework Directive 2008[80] and the Waste (England and Wales) Regulations 2011, as amended[81]

10.2.3 The revised Waste Framework Directive sets out a 5-step waste hierarchy for waste management as an important requirement which applies to anyone who produces or manages waste. The waste hierarchy ensures that waste is dealt with in the following order or priority:

1) Prevention
2) Preparing for re-use
3) Recycling
4) Other recovery (for example energy recovery)
5) Disposal, only as a last resort

10.2.4 The following considerations must be taken into account:

- The general environmental protection principles of precaution and sustainability
- Technical feasibility and economic viability
- Protection of resources
- The overall environmental, human health, economic and social impacts

10.2.5 The Waste (England and Wales) Regulations 2011, implement parts of the revised Waste Framework Directive, particularly the principles of Waste Hierarchy.

10.2.6 Site Waste Management Plans[82] (SWMPs) are no longer mandatory for projects commencing after 1 December 2013. They are, however, recommended, and the principles behind the Regulations remain best practice.

[80] European Union (2008) Waste Framework Directive 2008/98/EC.
[81] Statutory Instrument (2011) The Waste (England and Wales) Regulations. No.988.
[82] Department for Transport (2004) Guidance for Construction Contractors and Climate Voluntary Code of Practice

Environmental Protection Act 1990

10.2.7 The Environmental Protection Act[83] defines the fundamental structure and authority for waste management and control of emissions into the environment. It outlines:

- The definition of controlled waste
- The requirements of the duty of care on in respect of waste and transferral of waste
- Waste collection and waste disposal authorities and their roles

The Landfill (England and Wales) Regulations 2002, as amended

10.2.8 The Landfill (England and Wales) Regulations 2002 (as amended)[84] require that landfill sites are classified into 1 of 3 categories, dependent on the chemical composition of the material. These are hazardous, non-hazardous, and inert. Prior to disposal, all waste must be pre-treated and waste producers must apply the waste hierarchy in the management of their wastes. If excavated materials are in accordance with Waste Acceptance Criteria (WAC) testing and Soil Guideline Values (SGVs), then a number of re-use and recycling opportunities exist.

The Waste Prevention Programme for England

10.2.9 The development of a Waste Prevention Programme[85] is a requirement of the revised Waste Framework Directive (2008/98/EC)[86] and takes forward a commitment in the government Review of Waste Policy in England 2011[87]. The programme sets a number of objectives to help people and organisations make the most of opportunities to save money by reducing waste.

National Policy Statement for National Networks

10.2.10 Section 5.52 of the National Policy Statement for National Networks (NPSNN)[88] 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*

[83] Chapter 43 - http://www.legislation.gov.uk/ukpga/1990/43/introduction accessed 08/09/2016
[84] Statutory Instrument (2002) The Landfill (England and Wales) Regulations. No.1559.
[85] Department for Environment, Food and Rural Affairs (2013) Waste Prevention Programme for England [online] available online at: https://www.gov.uk/government/publications/waste-prevention-programme-for-england, (last accessed March 2017).
[86] European Union (2008) Waste Framework Directive 2008/98/EC.
[87] Department for Environment, Food and Rural Affairs (2011) Government Review of Waste Policy in England [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69401/pb13540-waste-policy-review110614.pdf (last accessed March 2017).
[88] 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).

disposal unless it can be demonstrated that the alternative is the best overall environmental outcome'.

National Planning Policy for Waste

10.2.11 The National Planning Policy for Waste[89] replaces 'Planning Policy Statement 10: Planning for Sustainable Waste Management' (PPS 10) and sets out detailed waste planning policies. It should be read in conjunction with other national planning policies for England, such as those contained in the NPPF (2012), Defra's Waste Management Plan for England (2013) and the National Policy Statements for Waste Water[90] and Hazardous Waste[91] (2012 and 2013 respectively).

10.2.12 The updated policy maintains the core principles of the plan led approach, with a continued focus of moving waste up the waste hierarchy.

10.2.13 The document sets out detailed waste planning policies to facilitate a more sustainable and efficient approach to resource use and management. When determining planning applications for non-waste development, the policy requires that local planning authorities should, to the extent appropriate to their responsibilities, ensure that:

- The likely impact of proposed, non-waste related development on existing waste management facilities, and on sites and areas allocated for waste management, is acceptable and does not prejudice the implementation of the waste hierarchy and/or the efficient operation of such facilities
- New, non-waste development makes sufficient provision for waste management and promotes good design to secure the integration of waste management facilities with the rest of the development and, in less developed areas, with the local landscape
- The handling of waste arising from the operation of developments maximises re-use / recovery opportunities, and minimises off-site disposal

The Waste Management Plan for England, 2013

10.2.14 Defra published the National Waste Management Plan for England in July 2013[92]. The plan outlines the waste hierarchy as a guide to sustainable waste management.

[89] Department for Communities and Local Government (2014) National Planning Policy for Waste [online] available at: https://www.gov.uk/government/publications/national-planning-policy-for-waste (last accessed March 2017).
[90] Department for Environment, Food and Rural Affairs (2012) National Policy for Waste Water [online] available at: https://www.gov.uk/government/publications/national-policy-statement-for-waste-water (last accessed March 2017).
[91] Department for Environment, Food and Rural Affairs (2013) Hazardous Waste National Policy Statement [online] available at: https://www.gov.uk/government/publications/hazardous-waste-national-policy-statement (last accessed March 2017).
[92] 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).

10.2.15 The Waste Management Plan for England sets out the Government's ambition to work towards a more sustainable and efficient approach to resource use and management. Positive planning plays a pivotal role in delivering England's waste ambitions through ensuring the re-use, recovery or disposal of waste is undertaken without endangering human health or harming the environment and delivering sustainable development and resource efficiency through all schemes.

10.3 Assessment methodology

10.3.1 There is currently no defined methodology for assessing the significance of effects on material assets. As such, the methodology used to determine the significance of potential environmental effects will be based on professional judgement recognising the requirements of the NPSNN. This approach will be clearly set out in the Environmental Statement (ES).

10.4 Study area

10.4.1 Currently there is no guidance available for defining the study area to be used for materials assessment. As a result, the study area, which will be adopted in the ES, has been determined through professional judgement by the influence of the scheme, rather than through a set geographical location. Therefore, the study area encompasses the use of material resources and the potential waste arisings that would occur within the scheme footprint.

10.4.2 During construction, the majority of waste will be generated within the immediate environment of the construction site and any re-use, recycling or treatment will, wherever practicable, take place on-site. However, where re-use or recycling is not practicable on-site, wastes will need to be removed to external facilities elsewhere. There is potential that disposal to landfill of some waste materials may be required, either locally or further afield, depending on the nature of the waste. The assessment will, therefore, take into account waste facilities located within the County of Somerset, which represent the closest waste facilities to the scheme.

10.5 Existing baseline

Material resources

10.5.1 Aggregates (sand, gravel and crushed rock) are the raw materials used to make construction products. There are 3 main sources of aggregate in the UK, these are as follows:

- Land-won (often referred to as natural or primary aggregates) – these are extracted directly from the ground in quarries or pits
- Marine-dredged – these comprise sand and gravel dredged from the sea floor
- Secondary/recycled – secondary aggregates are a by-product from mineral operations or industrial processes, and recycled aggregates are materials produced by treatment of construction and demolition waste.

Current local aggregate reserves

10.5.2 Baseline conditions for material resources have been established through desk-top research, and has been based on available aggregate resources data for Somerset County Council. Information has been obtained from the Somerset Local Aggregate Assessment[93] and the Somerset Minerals Plan[94].

10.5.3 Somerset is the largest producer of crushed rock in the south of England, the vast majority of which is extracted from the quarries in the east Mendip Hills, with an average of over 10 million tonnes per year produced in recent years.

10.5.4 The permitted reserves of crushed rock in Somerset at the end of 2015 were approximately 380 million tonnes.

10.5.5 Somerset currently has no land-won sand and gravel workings and superficial deposits of sand and gravel in Somerset are generally limited. Therefore, Somerset does not currently maintain its own landbank of permitted reserves for sand and gravel and has not extracted sand and gravel during the past 10 years. The sand and gravel apportionment for the county was previously shared with that of Devon and Cornwall.

10.5.6 Devon's fifth Local Aggregate Assessment (2016) reported sand and gravel permitted reserves at the end of 2015 of 7 million tonnes, with a landbank period of 12.5 years.

10.5.7 Marine dredged sand and gravel originating from the Bristol Channel is landed at Dunball Wharf. Approximately 55,000 tonnes of marine-dredged sand and gravel was landed at this wharf in 2015.

Permitted aggregate quarries

10.5.8 Table 10.1 below outlines the active permitted aggregate quarries and the mineral extracted across Somerset and Exmoor (excluding inactive and dormant sites).

[93] Somerset County Council (2015) Somerset Local Aggregate Assessment *Fourth Edition:* incorporating data from 2006-2015 [online] available at: http://www.somerset.gov.uk/policies-and-plans/plans/somerset-minerals-plan/ (last accessed November 2017)
[94] Somerset County Council (2015) Somerset Minerals Plan: Development Plan Document up to 2030 [online] available at: http://www.somerset.gov.uk/policies-and-plans/plans/somerset-minerals-plan/ (last accessed November 2017)

Table 10.1: Permitted aggregate quarries in Somerset and Exmoor

Quarry	Operator	Mineral	Permitted Annual Output (tonnes)	Grid Reference
Battscombe	Hanson Quarry Products Europe Ltd.	Carboniferous Limestone	1.3 million	ST 459 544
Callow Rock	Aggregate Industries UK Ltd.	Carboniferous Limestone	1.3 million	ST 447 560
Cannington Park Castle Hill	Castle Hill Quarry company Ltd.	Carboniferous Limestone	190,000 combined output	ST 251 403
Gurney Slade	Morris and Perry Ltd.	Carboniferous Limestone	2.0 million	ST 625 493
Halecombe	Lafarge Tarmac Ltd.	Carboniferous Limestone	1.0 million	ST 701 474
Moons Hill	John Wainwright and Company Ltd.	Igneous Silurian andesite	Unlimited	ST 662 460
Torr Works	Aggregate Industries UK Ltd.	Carboniferous Limestone	8.0 million	ST 693 463
Whatley Hanson	Quarry Products Europe Ltd.	Carboniferous Limestone	8.0 million	ST 732 480

Source: Somerset County Council (2015) Local Aggregate Assessment

Recycled aggregates

10.5.9 Table 10.2 below outlines the permitted, fixed aggregate recycling facilities in Somerset.

Table 10.2: Fixed aggregate recycling plans in Somerset

Location	Application Number
O.S. 2000 (pt) Colham Lane, Cricket St Thomas, Chard, TA20 4BX	13/02398/CPO
Emborough Quarry, Emborough, Radstock	106720/008
Rear of Sycamore House, Walrow, Highbridge	1/12/06/006
Dunwear Depot, Rivers Lane, Dunwear, Bridgwater	1/09/97/009
Land off A359/A303 slip road, Sparkford, Yeovil	96/02117/CPO
Southwood Waste Management Facility, Southwood Common, Evercreech, Shepton Mallet, BA4 6LX	054492/028
Colemans Quarry, Holwell	077905/012
Lower Farm, Podimore	02/02128/CPO

Source: Somerset County Council (2015) Local Aggregate Assessment

Generation and management of waste

10.5.10 The most recent information available relating to current waste generation and operational waste facilities in Somerset and the South West region has been gathered to provide the baseline for this assessment. 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, South Somerset District Council, and Somerset County Council.

Waste Generation in the south west and England

10.5.11 The latest data from the Environment Agency indicated that England produced over 191.1 million tonnes of waste in 2015 (Table 10.3), which was managed in 6,427 permitted waste facilities[95]. The South West region produced over 22.6 million tonnes of waste in 2015 (Table 10.3), which was managed by 874 waste sites.

Table 10.3: Waste Breakdown by Site Type (2015)

Site Type	Somerset (tonnes)	South West (tonnes)	England (tonnes)
Landfill	464,000	3,461,000	43,932,000
Transfer	263,000	3,653,000	44,946,000
Treatment (excluding metal recycling sector)	506,000	6,468,000	64,156,000
Metal Recovery	82,000	1,327,000	13,182,000
Incinerated	0	209,000	10,379,000
Use of Waste	153,000	730,000	2,009,000
Land Disposal	259,000	1,851,000	12,578,000
Total	**1,727,000**	**22,699,000**	**191,182,000**
Use of Waste			
In construction	150,000	413,000	1,063,000
In reclamation	3,000	284,000	848,000
To manufacture timber	0	32,000	98,000
Land Disposal			
Deposited in landfill for recovery/benefit	259,000	1,817,000	12,336,000
Borehore and lagoon inputs	0	34,000	242,000
Hazardous Waste*			
Managed	46,768	417,435	4,607,527
Deposited	38,715	433,719	4,966,543**

Source: Environment Agency (2017) Waste Management for England 2015

Notes: *The data is a summary of the registered hazardous waste movements. The same waste may have been moved between multiple facilities and each separate movement is recorded.

**Does not include 2,525 tonnes to unspecified destinations

10.5.12 With respect to construction and demolition waste, the Environment Agency recorded that 715,000 tonnes of inert construction and demolition waste deposited in landfill in the South West region, with 27,000 tonnes landfilled in Somerset. There are no figures available showing how much construction and demolition waste was recovered or recycled or how much was contaminated soil. However, the Environment Agency recorded that 413,000 tonnes of waste material were used in construction (under permits) within the south west and 150,000 tonnes of waste material was used in construction in the Somerset in 2015. A further 1.8 million tonnes were deposited in landfill for recovery/ land benefit with 259,000 tonnes deposited in the Somerset (Table 10.3).

10.5.13 Regarding hazardous waste, the ENV23 – UK Statistics on waste[96] produced by Defra details that in 2014, over 4 million tonnes were produced in the UK with just under 750,000 tonnes produced by the construction sector, of which just over 600,000 tonnes was produced in England.

[95] 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)

[96] 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)

Potential Hazardous Waste Arisings

10.5.14 To identify potential sources of contamination an initial review of the landfill sites, both authorised and historic, in the area was undertaken, these are shown on the environmental constraints plan in appendix A.1. Potential sources of contamination that are greater than 500 metres away from the study area have not been considered, as these are considered unlikely to affect the proposed scheme.

10.5.15 There are no authorised landfills and 2 historic landfills within 500 metres of the scheme. For details of these historic landfills, see Table 10.4 below.

Table 10.4: Historic landfill sites within 500m of the scheme

Site name	Site address	Type/wastes accepted	Status	Distance from scheme
Land Adjacent to Hazlegrove Park	Sparkford Bypass, Sparkford	Accepted inert and household waste.	Last received waste: 20 June 1990.	Adjacent / within the boundary of the scheme.
Camel Hill Quarry	Queen Camel, Sparkford	Accepted inert and industrial waste (which excludes waste from mines, quarries, and agricultural wastes).	Last received waste: 5 June 1992.	160m from the scheme (at the closest point).

Source: Environmental Agency (2017) What's in your backyard?

10.5.16 In addition, as indicated in chapter 9 Geology and Soils, 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. For more information on the potential contamination risks see chapter 9 Geology and Soils.

Waste facilities

10.5.17 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 (Table 10.5).

Table 10.5: Permitted waste facilities (2015)

Site Type	South West		England	
	Number of sites with an environmental permit at the end of 2015	*Number of sites that accepted waste in 2015*	*Number of sites with an environmental permit at the end of 2015*	*Number of sites that accepted waste in 2015*
Landfill*	60	40	493	343
Land Disposal	64	50	317	191
Incineration	18	8	141	78
Transfer	355	301	3,063	2,364
Treatment	343	276	2,688	2,052
Metal Recovery	278	160	2,474	1,277
Use of Waste	64	39	226	122
Total	**1,182**	**874**	**9,402**	**6,427**

Source: Environmental Agency (2017) Waste Management in South West 2015

Waste disposal sites

10.5.18 Regarding landfill sites, Table 10.6 outlines operational landfill sites within Somerset, and the distance of these sites from the scheme.

Table 10.6: Operational landfills accepting inert and non-hazardous waste in Somerset

Site Name	Site address	Type of waste accepted	Approximate distance from the scheme
Walpole Landfill Site	Walpole Landfill Site, Pawlett, Bridgewater, Somerset, TA6 4TF	Non-hazardous and stable non-reactive hazardous waste (such as asbestos)	29km
Dimmer Landfill Site*	Dimmer Landfill Site, Dimmer, Somerset, BA7 7NR	Non-hazardous	6km
Whiscombe Hill Landfill	Whiscombe Hill Landfill Site, Westcombe Hill, Somertonfield Road, Somerton, Somerset, TA11 6PZ	Non-hazardous	9km
Lime Kiln Hill Quarry Landfill Site	Lime Kiln Hill Quarry, Mells, Somerset, BA11 3PH	Inert	27km
Whiteball Landfill	Land / Premises at, Whiteball Hill, Wellington, Somerset, TA21 0LT	Inert	49km

Source: Somerset County Council (2015) Waste Core Strategy and Environment Agency (2017) What's in your backyard?
Notes: *Dimmer Landfill Site also has facilities for consolidating hazardous material waste before treatment or disposal elsewhere.

10.5.19 The Somerset Waste Core Strategy outlines that there is sufficient capacity at Walpole, Dimmer, and Whiscombe Landfill Sites to meet Somerset's requirements for non-hazardous landfilling until at least 2028, however due to the limited planning life remaining at Lime Kiln Hill Quarry and Whiteball Landfill there will be a theoretical need to plan for over 300,000m^3 of inert landfill void space post 2015[97].

Waste recycling facilities

10.5.20 Table 10.7 outlines facilities in Somerset which generate recycled aggregates, treat or transfer construction and demolition waste and / or treat / handle soil.

10.5.21 These sites are estimated to provide capacity to recycle more than 1 million tonnes of inert waste per annum[98].

[97] Somerset County Council (February 2015) Somerset Waste Core Strategy: Development Plan Document up to 2028 [online] available at: http://www.somerset.gov.uk/policies-and-plans/policies/somerset-waste-core-strategy/ (last accessed May 2017)
[98] 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)

Table 10.7: Facilities which generate recycled aggregates, treat or transfer construction and demolition waste and / or treat / handle soil in Somerset (May 2015)

Company / operator	Site / location	Time limit
AA Pike Construction Ltd	Colham Lane Waste Transfer Station, Chard	
Aggregate Industries UK Ltd	Colemans Quarry – aggregate recycling, Frome	21/02/2042
Burnham Waste Ltd	Unit 2, Walrow Industrial Estate, Highbridge	
Cheddar Skips	Burcott House Farm Waste Transfer Station, Wells	
Commercial Recycling Ltd.	Southwood Waste Management facility, Shepton Mallet	30/09/2019
Erwin Rhodes Contracting Ltd.	Axe Road Waste Transfer Station, Bridgwater	
Glastonbury Skip Hire	The Mound, Glastonbury	
J D Pope & Sons Ltd	rear of Sycamore House, Highbridge	
J W Ransome & Sons	Bunns Lane Waste Transfer Station, Frome	
L A Moore Demolition Ltd	The Old Railway Yard, Wells	
Luffman Plant Ltd	Norton Fitzwarren Sidings, Taunton	31/12/2019
Minehead Skip Hire (formerly)	Blackmores Yard, Minehead	
Podimore Recycling	Lower Farm – asphalt processing plant, Yeovil	
Podimore Recycling	Lower Farm – C&D recycling, Yeovil	
R K Bell Ltd	Dunwear Depot, Bridgwater	
RM Penny (Plant Hire + Demolition)	Emborough Quarry - inert recycling Depot, Radstock	
S Roberts and Son (Bridgwater) Ltd.	Castlefields Waste Transfer Station, Bridgwater	
S Roberts and Son (Bridgwater) Ltd.	Spaxton Road, Bridgwater	31/12/2016
Smilers Sand and Gravel	The Old Quarry, North Newton	
Towens	Compound 3, Bridgwater	
Viridor	Walpole - inert waste, Bridgwater	Expires on completion of the landfill
Wasteology Ltd	Greenham Quarry Waste Transfer Station, Wellington	
Wellington Waste Management	Wellington Waste Transfer Station, Wellington	
West Somerset Skip Hire	West Somerset Skip Hire, Minehead	
Westcombe Waste Ltd	Whiscombe Hill Waste Transfer Station, Somerton	31/12/2042
Western Skip Hire	Lime Kiln Hill Waste Transfer Station, Frome	30/03/2020
YPH Waste Management	5, Artillery Road, Yeovil	

Source: 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)

Waste recovery facilities

10.5.22 The latest information available on recovery operations in Somerset is from 2013. Table 10.8 lists the inert waste recovery sites operating under Environment Agency permits in Somerset in 2013. Collectively these 10 sites provide capacity in excess of 1.25 million tonnes, which is well in excess of the amount of inert waste generated in Somerset[99]. However, recovery operations tend to be relatively short, fixed-term projects where only the minimum amount of inert waste must be used to achieve the stated purpose. Therefore, the operational recovery facilities in Somerset are likely to change over time, however, Table 10.8 gives an indication of the potential capacity of recovery operations in Somerset. Suitable recovery operation facilities should be identified before commencement of construction.

[99] 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)

Table 10.8: Inert waste recovery projects in Somerset (Operational during 2013)

Company / operator	Site / location	Environment Agency permit type	Estimated capacity for project (tonnes)*
B+J Haulage	Middlemoor Water Park, Woolavington	A25	225,000
Beaton,	Ashley Ash View farm acoustic bund, Somerton	SR2010 No 8	59,400
Canvin Anthony	The Old Quarry, Somerton	SR2010 No 10	99,999
Commercial Recycling Ltd	Riding Gate Acoustic Bund, Wincanton	A25	49,999
Davies, Robert	Haygrass Nurseries, Taunton	SR 2010 No 7	49,999
Hazelden, Keith + Janet	Fulwood, Taunton	SR 2010 No 8	99,999
Hopkins Development	Sutton Farm, Yeovil	SR2010 No 8	99,999
Ling, Steve John	Bowler Eggs, West Buckland	SR2010 No 7	49,999
Notaro, S	Huntworth Golf Club, North Petherton	A25	475,200
RM Penny (Plant Hire + Demolition)	Clapton Lane Piggeries, Chilcompton	SR2010 No 7	49,999
Total			**1,259,593**

Source: 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).

*Projects can be multi-year, so this does not equate to an annual throughput. Actual throughput was less than 250,000 tonnes in total for these 10 sites in 2013, indicating the potential capacity provided by these types of projects.

10.5.23 Operational incinerators within the South West region have also been identified and are presented in Table 10.9.

Table 10.9: Operational incinerators (during 2015) in the south west region (within 100km of the scheme)

Operator name	Site name and address	Sub-region	Type	Permitted capacity (tonnage)	Approximate distance from the scheme
Earthminded UK Ltd	Avonmouth Drum Incinerator Plant, Avonmouth Way West, Avonmouth, Bristol, BS11 9HD	West of England Unitaries	Hazardous	9,000	53km
Cyclerval (UK) Ltd	Exeter Transfer Station, Grace Road South, Marsh Barton Trading Estate, Exeter, Devon, EX2 8QE	Devon	Municipal and/or industrial & commercial	60,000	72km
Avonmouth Bio Power Energy Ltd	Avonmouth Energy Facility, Former Britannia Zinc Works, Kings Weston Lane, Avonmouth, Avon, BS11 8AZ	West of England Unitaries	Municipal and/or industrial & commercial	120,000	54km
SITA UK Ltd*	Avonmouth End of Life Plastics Facility, Avonmouth Resource Park, Merebank Road, Kings Weston Lane, Avonmouth, Bristol, Avon, BS11 9FG	West of England Unitaries	Municipal and/or industrial & commercial	6,000	55km

Source: Environmental Agency (2017) Waste Management in South West 2015
Notes: *Site now operational, albeit at very reduced capacity

10.6 Value (sensitivity of resources and receptors)

10.6.1 Materials required for the construction of the scheme are likely to be obtained from a range of different sources, all of which will have their own specific environmental effects, which may or may not have been subject to an environmental assessment. Therefore, there are no obvious environmental receptors or resources for materials in the way that there are for other topic areas. Consequently, this precludes the application of a methodology to derive a measure of significant of the use and consumption of materials based on the value or sensitivity of a resource / receptor and the magnitude of an identified impact.

10.7 Consultation

10.7.1 No consultation regarding the materials assessment has been undertaken with consultation bodies to date.

10.8 Assumptions and limitations

10.8.1 Estimates of the cut and fill volumes are included within this chapter, although these figures are likely to change as the scheme design progresses and evolves. Quantities of materials required and the waste anticipated to be generated for the construction of the scheme are not available at this stage, as the preliminary design has not been finalised. Therefore, only a qualitative assessment has been carried out at this stage, limited to identifying activities that are likely to require significant quantities of materials, or are likely to generate significant quantities of waste.

10.8.2 Conclusions and recommendations may be revised within the ES, on the basis of updated information following further research, survey, and investigation.

10.9 Design and mitigation measures

Construction

10.9.1 Measures would be implemented to reduce the effects of material resource use and waste generation by the scheme during construction.

10.9.2 Consideration would be given throughout the scheme design to minimising the use of virgin materials, through reducing the material requirements within the design itself, through utilising new infrastructure that contains a high proportion of recycled content (where design constraints allow), and by designing to re-use and recycle site-won materials, wherever possible. The Mott MacDonald Carbon Portal would continue to be used throughout the scheme progression, in order to inform a low carbon design which would subsequently aid in reducing the material requirements of the scheme.

10.9.3 The scheme would apply the waste hierarchy to minimise disposal and maximise re-use and recycling. For example, through the re-use of excavated soils on-site for landscaping, and through the recycling of inert material by crushing, blending and subsequent re-use e.g. as an aggregate. Where waste cannot be re-used or recycled on-site, opportunities should be sought for the re-use of material on other nearby schemes, or in other uses with clear benefits to the environment, e.g. in the remodelling of agricultural land, or in the restoration of nearby quarries or other excavation sites. The Somerset Waste Core Strategy[100] outlines that Somerset has a long history of aggregate and building stone production, and therefore there may be opportunities for the re-use of inert waste in quarry restoration, subject to the waste being suitable. Therefore, the re-use of inert waste material in the restoration of nearby quarries, would be

[100] Somerset County Council (February 2015) Somerset Waste Core Strategy: Development Plan Document up to 2028 [online] available at: http://www.somerset.gov.uk/policies-and-plans/policies/somerset-waste-core-strategy/ (last accessed May 2017)

investigated. By re-using and recycling as much waste as practicable, this would reduce the amount of waste going to landfill.

10.9.4 The appointed Contractor would produce a Construction Environmental Management Plan (CEMP) which would detail mitigation measures to be adhered to on-site to reduce impacts on material resources and waste generation during the remediation / preparation, demolition and construction phases. An Outline CEMP will also be prepared in support of the Development Consent Order (DCO) application as part of the Environment Impact Assessment (EIA).

10.9.5 Consideration would be given to the need for a SWMP, which would consider the sourcing, transport, and use and disposal of waste in a sustainable manner. The SWMP would also take account of, and capture, design changes as the scheme design evolves and would ensure that unavoidable construction waste is identified and able to be managed in accordance with the waste hierarchy and other relevant legislative requirements. The SWMP would be used to derive the management options that would achieve the highest practicable performance levels within the hierarchy.

10.9.6 A Materials Management Plan (MMP) should also be produced by the Contractor for the earthworks. This would ensure that site-won and imported materials comply with an earthworks specification ensuring that the geotechnical and chemical composition is acceptable before being used on-site during construction. The MMP would also detail information on the cut and fill balance.

10.9.7 The preparation of a CEMP, SWMP and MMP would ensure that any adverse effects associated with material resource use and the management and generation of waste are managed. If developed and used appropriately, it is feasible that through the implementation and use of these plans, any potentially significant effects resulting from material resource use and waste generation from the construction phase could be reduced.

Operation

10.9.8 No mitigation measures have been identified with respect to materials.

10.10 Assessment of effects

Use of material resources

Construction

10.10.1 The scheme is likely to require large quantities of material resources and will therefore have permanent direct adverse effects on the environment, specifically through the depletion of natural resources. It is outside of the scope of the assessment to assess the environmental effects associated with the raw materials extraction, and processing and manufacturing of products, as these are likely to be subject to separate environmental assessments. The use of material resources would also be likely to generate adverse environmental effects through the transportation of materials (for use on-site), however the

effects of this are more logically dealt with within chapter 5 Air Quality and chapter 11 Noise and Vibration, and will therefore not be included within the scope of the materials assessment.

10.10.2 The scheme is likely to require large quantities of material resources for the construction of the carriageway and associated structures. The types of material resources likely to be required are as follows:

- Steel
- Concrete
- Fly ash
- Plastic
- Clay
- Iron
- Cement
- Aggregate
- Bitumen

10.10.3 Specific quantities of materials have not been quantified at this stage. However, the cut and fill volumes have been estimated and are presented in Table 10.10 below. At this stage it is assumed that all fill material would be suitable for re-use on-site, and therefore as there would be sufficient quantity of cut material to be used for fill, it is unlikely that significant effects regarding the consumption of material resources would result from this aspect of the works.

Table 10.10: Estimated cut and fill volumes for the scheme

Cut	Fill	Overall balance
773,959m^2	597,284m^2	176,675m^2 surplus

* Cut fill balance figures are indicative at this stage and subject to change as the design of the scheme progresses. The cut fill balance figures reflect estimated required landscaping volumes rather than surplus volumes currently within the engineering model

Operation

10.10.4 There would be minimal requirements for materials, besides in frequent maintenance activities, and therefore there are unlikely to be any significant adverse effects.

Generation and management of waste

Construction

10.10.5 The generation and management of waste as a result of the construction of the proposed scheme, may result in adverse environmental effects including the temporary occupation of waste management facility space (from treatment of waste) and the permanent reduction to landfill capacity (from disposal of waste). However, the proposed scheme would aim to minimise the generation of waste wherever practicable, through the implementation of the waste hierarchy (see Section 11.8 below). The generation and management of waste would require transport off-site, however as per paragraph 10.10.1, this is more logically dealt with in chapter 5 Air Quality and chapter 11 Noise and Vibration and is therefore considered within the Construction phase assessment for these topics.

10.10.6 Exact quantities of waste likely to be generated by the construction of the proposed scheme have not been quantified at this stage. However, waste may result from the following:

- Surplus excavated materials (soils or substrata)
- Green waste (from vegetation removal or management)
- Waste from the demolition of existing structures (only 1 agricultural barn requires demolition)
- Contaminated soils from excavations (which may be classified as hazardous waste)
- Surplus construction materials (e.g. concrete, aggregates, asphalt)

10.10.7 As noted in Table 10.10, there would be a surplus of cut material of approximately 176,675m^2, it is assumed at this stage that this surplus material is suitable to be used in the landscaping for the scheme. As long as waste is managed appropriately, implementing the mitigation measures outlined in section 10.9 it is unlikely that the generation and management of waste would result in significant effects.

Operation

10.10.8 The operation of the proposed scheme would be unlikely to generate significant quantities of waste.

10.11 Enhancement measures

10.11.1 No enhancement measures over and above the mitigation measures outlined in section 10.9 are proposed. Unlike other topic areas, there are no enhancement measures that can be proposed to enhance the material resource environment within the study area, as much of this is governed by the waste management facilities in the area, which are out of the control of the project.

10.12 Monitoring requirements for significant adverse effects

10.12.1 There are potential for significant adverse effects from the quantity of material resources required for the construction of the scheme. Material and waste audits should therefore be undertaken throughout the construction phase. This would ensure that re-use and recycling targets are met on-site and would ensure that there is no surplus of materials. By conducting audits regularly this would give an indication of where continual improvements to waste management and minimisation can be made throughout the construction phase.

10.12.2 The SWMP should also be used to measure and monitor the types and quantities of waste taken off-site, to ensure that the waste hierarchy is being implemented where practicable.

10.13 Conclusions

10.13.1 At this stage, it is anticipated that the quantity of material resources required to construct the scheme would be significant. Mitigation measures would ensure

that the re-use of materials is made a priority, and would ensure that preference is given to the use of recycled materials or materials with a high proportion of recycled content. It is likely that significant effects can be appropriately mitigated. However, in the absence of accurate material quantification of the preliminary design, this assumption cannot be confirmed. Therefore, further assessment will be required to confirm this assumption, and will be included as part of the ES.

10.13.2 The scheme would be likely to generate waste during construction which would need to be appropriately managed. Consideration will be given to the need for a SWMP, which would consider the sourcing, transport and use and disposal of waste materials in a sustainable manner. Following the implementation of a SWMP and appropriate mitigation measures, the generation and management of waste is not anticipated to result in significant direct or indirect effects. However, in the absence of accurate quantification and a construction strategy, further assessment will be required within the ES to confirm this assumption.

11 Noise and vibration

11.1 Introduction

11.1.1 This chapter presents the on-going work for the assessment of the potential effects associated with the scheme upon noise and vibration, during both construction and operation.

11.1.2 This chapter has been prepared in accordance with DMRB Volume 11, Section 3, Part 7[101] which provides guidance on the assessment of noise and vibration associated with highway schemes. Further detailed assessment is currently under way, and will be reported within the Environmental Statement (ES) that will be submitted to support the Development Consent Order (DCO) application.

11.1.3 Construction and operation of the scheme has the potential to give rise to both temporary and permanent noise and vibration at the sensitive receptors in the area, which in turn may cause effects, beneficial or adverse. One of the key environmental objectives of the scheme is to avoid or mitigate adverse impacts.

11.2 Legislation and policy context

11.2.1 The following legislation and policy are relevant to the scheme.

The Noise Policy Statement for England

11.2.2 The Noise Policy Statement for England (NPSE)[102] was issued by the Department for Environment Food and Rural Affairs (Defra) in 2010. Its purpose is to promote, *"good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development"*. The 3 main aims are to:

- Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development
- Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development
- Where practicable, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development

11.2.3 Within the aims stated above there are several key phrases that lead to additional concepts now considered in the assessment of noise impact, these and their definitions are detailed below:

[101] The Design Manual for Roads and Bridges Volume 11, Section 3, Part 7 'Noise and Vibration', HD 213/11.
[102] DEFRA (2010). "The Noise Policy Statement for England"

- Lowest Observed Adverse Effect Level (LOAEL): this the level above which adverse effects on health and quality of life can be detected
- Significant Observed Adverse Effect Level (SOAEL): this is the level above which significant adverse effects on health and quality of life occur

11.2.4 There are no pre-defined levels for these effect levels as it is acknowledged that they will be different for different sources, different receptors and at different times. The levels used in this assessment are defined in section 11.3 of this report.

National Policy Statement for National Networks

11.2.5 The National Policy Statement for National Networks[103] (NPSNN) sets out *"the Government's vision and policy for the future development of nationally significant infrastructure projects on the national road and rail networks in England*". The NPSNN provides guidance for promoters of Nationally Significant Infrastructure Projects (NSIP) and provides the basis for examination by the examining authority and decision making by the Secretary of State (SoS).

11.2.6 The NPSNN requires that:

11.2.7 *"Due regard must…be given to the relevant sections of the Noise Policy Statement for England, National Planning Policy Framework and the Government's associated planning guidance on noise" and,*

11.2.8 *"Applicants should consider opportunities to address the noise issues associated with the Important Areas as identified through the noise action planning process."*

Planning Practice Guidance

11.2.9 Planning Practice Guidance[104] is a Government web-based resource which provides guidance on how the policies set out in NPPF may be interpreted in practice for a wide range of issues. There is a subsection of PPG relating specifically to noise:

11.2.10 *"Local planning authorities' plan-making and decision taking should take account of the acoustic environment and in doing so consider:*

- *Whether or not a significant adverse effect is occurring or likely to occur*
- *Whether or not an adverse effect is occurring or likely to occur*
- *Whether or not a good standard of amenity can be achieved*

11.2.11 *In line with the Explanatory Note of the Noise Policy Statement for England, this would include identifying whether the overall effect of the noise exposure (including the impact during construction wherever applicable) is, or would be, above or below the significant observed adverse effect level…"*

[103] 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 August 2017).
[104] Department for Communities and Local Government (2014) Planning Practice Guidance,

The Environmental Noise (England) Regulations 2006

11.2.12 These Regulations[105] 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. As a result of the process, the "Noise Action Plan: Roads (Including Major Roads)[106]" was published, which identified 'Important Areas' for future mitigation.

The Land Compensation Act 1973 Part 1

11.2.13 The Land Compensation Act 1973 Part 1[107] includes provision for compensation for loss in property value resulting from physical agents, including noise and vibration, resulting from the use of public works, such as new or improved roads.

The Noise Insulation Regulations 1975 (amended 1988)

11.2.14 The Noise Insulation Regulations 1975 (amended 1988)[108] were made under Part 2 of the Land Compensation Act for the obligatory and discretionary provision of noise mitigation measures for dwellings adjacent to new highways.

Sections 60 and 61 of the Control of Pollution Act 1974

11.2.15 Local Authorities have other statutory controls on noise and vibration. Sections 60 and 61 of the Control of Pollution Act 1974[109] concern impacts relating to construction sites, and the Environmental Protection Act [110]1990 Sections 79 and 80 place a duty on local authorities to serve abatement notices where noise from premises, vehicles and machinery are judged to constitute a statutory nuisance. Compliance with these controls is required, although the requirements fall outside the planning system.

British Standard (BS) 5228-1:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise'[111]

11.2.16 British Standard (BS) 5228 'Code of practice for noise and vibration control on construction and open sites' – Part 1: Noise, provides a methodology for predicting noise levels generated by fixed and mobile plant used for a range of typical construction operations and describes criteria for the assessment of potential significance of noise effects. The standard includes a database of noise levels at a reference distance of 10m from the source and a simple noise

[105] Environmental Noise Regulations available online at http://www.legislation.gov.uk/uksi/2006/2238/pdfs/uksi_20062238_en.pdf
[106] Noise Action Plan: Roads (Including Major Roads) Environmental Noise (England) Regulations 2006, as amended January 2014
[107] HMSO, (1973). "Land Compensation Act."
[108] HMSO,(1975). "Noise Insulation Regulations. Statutory Instruments No. 1763. Building and Buildings."
[109] HMSO (1974). "Control of Pollution Act – Part III Noise."
[110] Parliament of the United Kingdom (1990) Environmental Protection Act, C.43
[111] BSI, (2009), amended 2014. "British Standard BS 5228 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise."

propagation model that can be used to make allowances for effects such as source-receiver distances, ground properties and utilisation time.

BS5228-2:2009 'Code of construction practice for noise and vibration control on construction and open sites - Part 2: Vibration'[112]

11.2.17 BS 5228 'Code of construction practice for noise and vibration control on construction and open sites - Part 2: Vibration' provides guidance on the effect of vibration and the likelihood it will cause complaint and cosmetic damage to buildings. This Standard also provides criteria for the assessment of the significance of effects. The assessment of vibration effects arising due to the scheme has been carried out in accordance with this Standard.

Calculation of Road Traffic Noise (CRTN) 1988[113]

11.2.18 Calculation of Road Traffic Noise 1988 (CRTN) provides procedures for predicting noise levels for a given flow of road traffic at sensitive receptors. These methodologies are used in the determination of entitlement under the Noise Insulation Regulations and for traffic noise change assessments undertaken in accordance with the DMRB methodology cited below.

DMRB Volume 11, Section 3, Part 7 'Noise and Vibration; (HD213/11 - Revision1) 2011

11.2.19 The DMRB Volume 11 Section 3 Part 7 HD213/11 Noise and Vibration describes a methodology for the assessment of road projects in the UK and best reflects EIA methodology as applied to highways. A method for assessment of both long and short-term effects has been introduced where previously only long-term effects were considered in evaluating effects.

11.3 Assessment methodology

11.3.1 Assessment methodology for defining the significance of effects upon noise and vibration is contained within Section 12.12 of the Environmental Impact Assessment Scoping Report submitted to the Planning Inspectorate in November 2017. However, it should be noted that the assessment methodology that will be used for the ongoing EIA will define significance where noise levels exceed Significant Observed Adverse Effect Level (SOAEL) and there is an increase of 1dB in the long-term or the short-term. Further details will be provided within the ES.

11.3.2 The Environmental Impact Assessment Scoping Report can be accessed here:

11.3.3 https://infrastructure.planninginspectorate.gov.uk/projects/south-west/a303-sparkford-to-ilchester/?ipcsection=docs.

[112] BSI, (2009) amended 2014. “British Standard BS 5228 Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration.”
[113] Department of Transport (1988) “Calculation of Road Traffic Noise”

11.4 Study area

11.4.1 The DMRB Volume 11 Section 3 Part 7 HD213/11 Noise and Vibration (2011) provides the methodology for assessment of road projects within the UK.

11.4.2 For operational noise, the methodology requires that the study area is identified as an area within 1km of the physical works associated with the scheme. Within this study area, road traffic noise predictions are performed at any sensitive receptor within 600m of a road where this is the possibility of a change of 1dB $L_{A10, 18hr}$ upon scheme opening, or 3 dB $L_{A10, 18hr}$ in the long-term.

11.4.3 For potential effects due to road traffic noise outside of the 1km area, the methodology requires that sensitive receptors be identified adjacent to roads where the change in received road traffic noise level would, as a result of the scheme, increase or decrease by at least 1dB $L_{A10, 18hr}$ on opening or 3dB in the long-term. Consequently, the spatial extents of the assessment extend beyond the physical works associated with the scheme.

11.4.4 For construction noise, the extent of the assessment is limited to areas where the calculated total noise (construction noise plus baseline noise) exceeds the baseline noise level by 5 dB or more, subject to threshold values of 65 dB(A) for daytime (weekdays 07:00 – 19:00; Saturdays 07:00 – 13:00), 55 dB(A) for evenings and weekends (weekdays 19:00 – 23:00; Saturdays 13:00 – 23:00; Sundays 07:00 – 23:00), and 45 dB(A) for night periods (23:00 – 07:00). This is largely restricted to the scheme envelope, although could extend along elements of the existing road network, depending on haul routes and the quantity of construction related traffic.

11.5 Existing baseline

11.5.1 The method for determining and appraising baseline conditions has been based on best practice guidance. This involves both desktop study and baseline survey work.

11.5.2 Sources included in the desk study are:

- Noise mapping undertaken as part of the requirements of The Environmental Noise (England) Regulations 2006
- OS mapping
- Consultation with the Local Authority
- Traffic flows
  Review of any previous surveys and assessments

11.5.3 The existing noise and vibration baseline is as follows:

- Two Noise Important Areas (NIAs) which are located within the footprint of the scheme on the existing A303 just to the east of Camel Cross and approximately 150 metres to the west of Howell Lane
- There are approximately 230 residential properties, 20 farms, 1 school and 12 commercial properties within 500 metres of the scheme

- Noise levels within the study area are dominated by traffic noise, reducing in level with distance from the main noise source, the A303

11.6 Value (sensitivity of resources and receptors)

11.6.1 Noise and vibration affects people in a number of different ways. This may include factors such as annoyance and sleep disturbance, anxiety, enjoyment of quiet spaces, ability to communicate with others, ability to concentrate at home or at work, participation in social and community activities.

11.6.2 Table 11.1 sets out typical classes of sensitive receptors. As a consequence, it is not appropriate to consider a single criterion when assessing the sensitivity of an existing noise environment, for the purposes of this assessment expressed as value.

11.6.3 Table 11.2 sets out criteria used in this assessment to determine the sensitivity of a receptor. It should be noted that, generally, the variation in the sensitivity of receptors in terms of noise impact is taken into account by applying different scales to classify magnitude of impact (e.g. by using different scales for day-time and night-time) rather than by varying the assignment of sensitivity to specific types of receptors.

11.6.4 The majority of the receptors that are expected to be affected by noise and vibration impacts arising due to the scheme would be dwellings. Therefore, according to Table 11.2, receptors are considered to be of high sensitivity.

Table 11.1: Noise and vibration resources and receptors

Resource / Receptor	Description
Dwellings	Houses and any other building in residential use such as public houses, hotels etc.
Commercial premises	Shops, offices etc.
Community facilities	Libraries, public halls, sports centres, theatres, concert halls, places of worship etc.
Recreational facilities	Amenity areas, footpaths, sports grounds etc.
Educational establishments	Schools, university campus.
Designated sites	If relevant, environmentally sensitive areas and buildings sensitive to the effect of noise and vibration.
Other	Any other premises highly sensitive to noise and vibration such as laboratories etc.

Table 11.2: Receptor Sensitivity

Sensitivity	Criteria
High	Receptors where occupants or activities are particularly susceptible to noise. Examples include: residences, quiet outdoor areas used for recreation, conference facilities, auditoria/studios, schools in daytime, hospitals/residential care homes and religious institutions e.g. churches or mosques.
Medium	Receptors moderately sensitive to noise, where it may cause some distraction or disturbance. Examples include: offices, restaurants and sports grounds where spectator noise is not a normal part of the event and where quiet conditions are necessary (e.g. golf or tennis).
Low	Receptors where distraction or disturbance from noise in minimal. Examples include residences and other buildings not occupied during working hours, factories and working environments with existing high noise levels and sports grounds where spectator noise is a normal part of the event.

Source: Adapted from the Guidelines for Environmental Noise Impact Assessment[114]

[114] IEMA (2014) Guidelines for Environmental Noise Impact Assessment [online] available at: https://www.iema.net/search-results?search=Guidelines+for+Environmental+Noise+Impact+Assessment (last accessed July 2017).

11.7 Consultation

11.7.1 To date, no topic specific consultation has been undertaken with respect to noise and vibration. For scheme wide consultation refer to section 2.7. Once the scheme design develops, consultation with the Local Authority Environmental Health Officer (EHO) will be necessary to discuss the effects of noise and vibration.

11.8 Assumptions and limitations

Assumptions regarding the baseline

11.8.1 To adequately characterise the baseline environment an extensive and detailed noise survey will be necessary. DMRB advises *"This [Detailed] level of assessment may be a desk-based exercise, supplemented with site-collected information needed to inform a quantitative assessment… [which] should include a noise measurement survey"*. Noise surveys occur at Detailed stage of assessment and will therefore be conducted for the scheme, as part of the Environmental Statement (ES).

11.8.2 Conclusions and recommendations may be revised within the ES, on the basis of updated information following further research, survey, and investigation.

Assumptions regarding the assessment of impacts

Construction assessment

11.8.3 Information on construction activities at this stage of the scheme is limited to a high-level description of construction sequences and provisional details of likely plant to be used.

11.8.4 To provide a quantitative assessment, detailed information would be required on plant, duration, method, location of construction compound, haul routes etc. At this stage in the assessment process insufficient information is available to quantify construction impacts, and these will be discussed qualitatively in the following sections. This section of the report identifies the potential impacts, describes how the effects of the impacts will be assessed, and what generic mitigation measures would be considered with regard to noise and vibration.

Operational assessment

11.8.5 The traffic data to be used for noise predictions is based upon the South West Regional Traffic Model (SWRTM) traffic data and standard prediction methodology. A full DMRB assessment requires extensive and detailed modelling of the scheme and the surrounding area, using detailed topographical data. At this stage of assessment, horizontal and vertical alignments of the scheme are incorporated into the acoustic model, however as the design progresses these may change.

11.8.6 Public domain LiDAR data is used to provide topographical and existing height data. Ordnance Survey Address-point data is used to locate residential receptors.

11.8.7 Mitigation measures in the form of acoustic bunds have been incorporated into the scheme design. Assessment within the ES will verify the sufficiency of the proposed mitigation.

11.9 Design, mitigation and enhancement measures

Construction

11.9.1 It is anticipated that the limits for normal working hours and levels of noise at nearby properties would be agreed by the Contractor in advance with local Authority EHOs and incorporated into the Construction Environment Management Plan (CEMP).

11.9.2 The Section 61 application (11.2.15) would require the use of best practicable means (BPM) for noise control at all times during construction. These should include the selection of the most appropriate method and plant for the job, adequate maintenance of plant, optimum siting of stationary plant, local screening and the education of the workforce. Restrictions may also be placed on early/late delivery times. Potentially affected residents should be kept informed in advance of the works and contact details be provided to request further information or to report disturbance. The production of this Section 61 application will include consultation with the local authority.

11.9.3 Incorporated mitigation related to construction noise and vibration will be set out within the CEMP This will identify the series of measures to reduce the environmental effects during the construction period and covers environmental and safety aspects affecting the interests of residents, businesses, all road users and the general public in the vicinity of the works. These measures will include considerations of the residents of early phases of the scheme during the construction period for later phases.

11.9.4 The effects of potential noise and vibration on local communities can be mitigated by effective communication between the promoter, contractor and the public. Prior notification of construction works to any potential affected residents will be required. Following that, investigation and remediation of noise issues during construction may also be required.

11.9.5 Where potentially significant effects of construction noise and vibration are predicted, the contractor would consult the Local Authority to determine potential additional mitigation measures for the scheme.

Operation

11.9.6 DMRB advises on reductions of sound from thin surface courses and acoustic barriers / bunds. For the purposes of this assessment it has been assumed that by the Design Year (2038) in the Do Minimum case, all existing trunk roads and motorways would be surfaced with thin surface course. The potential requirement for acoustic bunds or fences will be established as part of the detailed assessment which will be reported within the ES.

11.10 Assessment of effects

Construction noise

11.10.1 Precise details of construction activities for the scheme are not available and an inventory of likely construction plant and associated noise levels has therefore been set out using professional judgement. Reference noise levels from Annexes C and D of BS 5228–1 have been assigned to the plant. Conservative assumptions have been made regarding the likely percentage of any given construction day that plant of a particular type would be operating. This information, broken down by construction activity is incorporated in Table 11.3. Each activity has been provided with a percentage operating time for any given hour of construction activity. In the absence of detailed contractor's information, professional judgement has been used in the assignment of this percentage.

Table 11.3: Plant information assumed for the construction noise assessment

Phase of work	Item of plant	Sound pressure level at 10m (dBA)	BS5228-1 reference	% on-time in any given hour
Site clearance	Tracked excavator	77	C2#2	50
	Lorry	80	C2#34	50
	Roller (rolling fill)	79	C2#37	25
Drainage	Wheeled excavator	70	C5#34	50
	Road lorry (full)	80	C6#21	50
Earthworks	Dozer	83	C5#15	50
	Lorry	80	C2#34	50
	Vibratory roller	75	C5#20	25
	Road lorry (full)	80	C6#21	50
Pavements and footways	Paving	77	C5#7	50
	Rolling and compaction of surface course	80	C5#31	25
	Rolling and compaction	77	C5#19	25
	Mixing Concrete	75	C5#28	50
Breaking and planing of existing carriageway	Planing existing carriageway	82	C5#7	50
	Backhoe mounted hydraulic breaker	88	C5#1	50
	Road Breaker (hand-held pneumatic)	86	C5#4	50
Signing and street lighting	Lorry with lifting boom	77	C4#53	50
Structures	Mobile telescopic crane	78	C4#38	50
	Concrete mixer truck (discharging)	75	C4#28	50

11.10.2 The plant noise levels and utilisation set out in Table 11.3 enable construction noise levels to be estimated for each construction activity as a function of distance from the works as set out in Table 11.4. It will be noted, even in the absence of mitigation, that the construction noise day-time SOAEL of 75dB L_{Aeq} (11.3.37) is generally not exceeded at a distance greater than 25 metres from the works. Conversely the night-time SOAEL of 55dB L_{Aeq} (11.3.37) is generally exceeded at all distances below 100 metres for most activities.

Table 11.4: Construction noise levels [dB] from typical activities

Typical activities	L_{Aeq} at 10m	L_{Amax} at 10m	L_{Aeq} at 25m	L_{Amax} at 25m	L_{Aeq} at 50m	L_{Amax} at 50m	L_{Aeq} at 100m	L_{Amax} at 100m
Site clearance	74	77	66	69	59	62	51	54
Earthworks and drainage	72	80	64	72	56	65	49	57
Pavements and footways	77	80	69	66	62	59	54	51
Breaking and planing of existing carriageway	88		80		72		65	
Signing and street lighting	74		66		59		51	
Structures	79		71		63		56	
Piling (augured)	80		72		64		57	

11.10.3 Figure 11.1 shows that most plant (excluding piling) would not exceed the vibration SOAEL of 1mm/s (11.3.39) at distances greater than 12m but where piling is required SOAEL may be exceeded at distances below 32m from the seat of the piles.

11.10.4 Construction traffic would need to increase flow by at least 25% to lead to a 1dB increase in noise levels and there is currently insufficient evidence to suggest that this will arise.

Operation

11.10.5 In terms of absolute noise levels and compliance with the aims of NPPF, the following exceedances of day-time SOAEL would occur:

- Do Minimum Opening Year (DMOY), 39 properties are at or above SOAEL
- Do Something Opening Year (DSOY), 42 properties are at or above SOAEL
- Do Minimum Design Year (DMDY), 44 properties are at or above SOAEL
- Do Something Design Year (DSDY), 51 properties are at or above SOAEL

11.10.6 From the above it can be seen that there is a small increase in numbers of receptors at or above SOAEL 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 case.

11.10.7 Results of traffic noise calculations at potentially affected dwellings are presented in accordance with HD 213/11 procedure in the following tables. Calculation results presented represent noise changes at the worst-affected façade of each property, at a height equivalent to first floor level.

11.10.8 The results for noise impacts at dwellings within 600 metres of affected routes within 1 kilometre, and adjacent to affected routes beyond 1 kilometre are presented in Table 11.5 and Table 11.6. In terms of night-time impacts, traffic noise effects are only assessed in the long-term, and for receptors subject to noise levels above 55dB.

Table 11.5: Short-term change in noise levels, Do Minimum 2023 - Do Something 2023

Change in noise level		Day-time	
		Number of dwellings	Number of other sensitive receptors
Increase in noise level, $L_{A10,18h}$	0.1-0.9	280	33
	1.0-2.9	89	10
	3.0-4.9	1	0
	5.0+	1	1
No change	0	20	1
Decrease in noise level, $L_{A10,18h}$	0.1-0.9	133	8
	1.0-2.9	19	3
	3.0-4.9	44	2
	5.0+	2	9

Table 11.6: Long-term change in noise levels, Do Minimum 2023 - Do Something 2038

Change in noise level		Day-time		Night-time
		Number of dwellings	Number of other sensitive receptors	Number of dwellings
Increase in noise level, $L_{A10,18h}$	0.1-2.9	510	50	82
	3.0-4.9	8	0	0
	5.0-9.9	1	0	2
	10.0+	0	1	0
No change	0	4	1	0
Decrease in noise level, $L_{A10,18h}$	0.1-2.9	62	5	2
	3.0-4.9	2	2	2
	5.0-9.9	1	5	1
	10.0+	1	3	0

Human health and wellbeing

11.10.9 The impact of noise in terms of human health and wellbeing can be assessed by considering the number of receptors subject to noise levels above SOAEL as this is the level above which significant adverse effects on health and wellbeing occur (section 11.3.2). The number of receptors above SOAEL for the Opening Year and Design Year are set out in Table 11.7.

Table 11.7: Number of receptors exceeding SOAEL

Scenario and Period	Number of residential receptors
DMOY	39
DSOY	42
DMDY	44
DSDY	51
Short-term increase DSOY v DMOY	3
Long-term increase DSDY v DMOY	12

11.10.10 Even when noise levels are below SOAEL, noise may affect health and wellbeing since LOAEL is the level at which adverse effects on health and quality of life can be detected.

11.11 Monitoring requirements for significant adverse effects

11.11.1 Any requirement for construction noise and vibration monitoring can only be established when full details of the plant involved and schedule have been determined. Construction monitoring guidance is given in Annex G of BS5228 Part 1 (11.2.16) for noise and in Section 9 of BS5228 Part 2 (11.2.17) for vibration.

11.11.2 The procedure for monitoring operational noise is set out in Section III of CRTN (11.2.18) which specifies what to measure and how the measured data should be processed.

11.12 Conclusions

11.12.1 An assessment has been undertaken that is broadly in line with the Simple assessment approach set out in DMRB (11.2.21). This chapter has set out the criteria to determine the significance of noise and vibration effects of the scheme and has presented tables which show the changes in noise level in both the short-term and the long-term.

11.12.2 Analysis shows a small increase in the number of receptors would be exposed to noise levels above SOAEL in both the short-term and long-term.

11.12.3 During construction, with best practice mitigation measures in place, an on-balance Not Significant Adverse effect is anticipated. An overall Not Significant Adverse effect is anticipated during operation.

12 People and communities

12.1 Introduction

12.1.1 This chapter presents the on-going work for the assessment of the potential effects associated with the proposed scheme upon People and Communities including Non-Motorised Users (NMUs), Amenity, Severance, Agricultural Land, Demolition of Private Property and Associated Land Take, Private Property, Development Land, Local Economy, Community Land, Motorised Travellers Views from the Road and Driver Stress. To address the requirements of the Infrastructure Planning (EIA) Regulations 2017, this chapter also covers effects on population and health.

12.1.2 People and Communities is identified as a Design Manual for Roads and Bridges (DMRB) factor within Interim Advice Note (IAN) 125/15[115]. However, the guidance contained within the DMRB Volume 11 Section 3 has not yet been updated. As a result, and pending new guidance, the assessment of People and Communities for this report has been prepared in accordance with the DMRB Volume 11, Section 3, Parts 6[116], 8[117] and 9[118].

12.1.3 To date, DMRB Simple level assessments have been undertaken for NMUs, Amenity, Severance, Agricultural Land, Demolition of Private Property and Associated Land Take, Motorised Travellers Views from the Road and Driver Stress sub-factors. Assessments for Private Property, Local Economy and Community Land sub-factors have been undertaken to a Scoping level.

12.1.4 Development Land was scoped out of further assessment at an early stage of the EIA. However, the baseline has been reviewed for this sub-factor, given the evolving nature of this type of land.

12.1.5 Further detailed assessment for those in-scope topics identified above is currently under way, and will be reported within the Environmental Statement (ES) that will be submitted to support the Development Consent Order (DCO) application.

12.2 Legislation and policy context

National legislation and policy

National Policy Statement for National Networks

12.2.1 The policies in the National Policy Statement for National Networks (NPSNN)[119] largely build on those originally stated in the National Planning Policy

[115] Highways England (2015) IAN 125/15 'Environmental Assessment Update'.
[116] The Design Manual for Roads and Bridges Volume 11, Section 3, Part 6 Land use.
[117] The Design Manual for Roads and Bridges Volume 11, Section 3, Part 8 Pedestrians, Cyclists, Equestrians and Community Effects.
[118] The Design Manual for Roads and Bridges Volume 11, Section 3, Part 8 Pedestrians, Cyclists, Equestrians and Community Effects.
[119] Department for Transport (2014) National Networks National Policy Statement: Presented to Parliament pursuant to Section 9 (8) and Section 5 (4) of the Planning Act 2008 [online] available at:

Framework (NPPF), but also confirms its commitment to providing people the opportunity to choose sustainable modes; expecting applications to identify opportunities to invest in infrastructure where communities (including pedestrians and cyclists) appear to be severed by the road network and in turn addressing historic problems, by designing and delivering schemes taking into account accessibility requirements for all, including disabled users.

12.2.2 Planning Practice Guidance[120] '*Open space, sports and recreation facilities, public rights of way and local green space'* is also of relevance.

12.2.3 It is also worth noting the importance of the Equalities Act 2010 which requires decision making to have regard to the desirability of reducing socio-economic inequalities[121].

12.2.4 In addition, *Safeguarding our Soils: A Strategy for England*[122] provides the national policy context for soils and *Technical Information Note 049* (TIN049)[123] describes the Agricultural Land Classification (ALC) system as a means to protect the best and most versatile agricultural land.

12.3 Assessment methodology

12.3.1 Assessment methodology for defining the significance of effects upon people and communities is contained within Section 13.11 of the Environmental Impact Assessment Scoping Report submitted to the Planning Inspectorate in November 2017. The Scoping Report can be accessed here:

12.3.2 https://infrastructure.planninginspectorate.gov.uk/projects/south-west/a303-sparkford-to-ilchester/?ipcsection=docs.

12.4 Study area

12.4.1 No study areas for People and Communities are specified in the DMRB Volume 11 Section 2 Part 4, and the DMRB Volume 11 Section 3 Parts 6, 8 and 9, and therefore the study areas used for this chapter have been defined through professional judgement, based on the type and scale of the scheme and the context of the surrounding area. These study areas are considered more than sufficient in terms of identifying the significance of effects in full.

- **Non-Motorised Users:** The study area comprises all NMU facilities including Public Rights of Way (PRoWs), footways, long distance walks and cycle routes within 250m of the scheme
- **Amenity:** The study area comprises all NMU facilities identified within 250 metres of the scheme

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/387222/NNNPS-print.pdf (Last accessed April 2017).

[120] Department for Communities and Local Government (2012) Planning Practice Guidance.

[121] Equalities Act (2010) [online] available at: http://www.legislation.gov.uk/ukpga/2010/15/contents (Last accessed March 2017).

[122] DEFRA (2009) Safeguarding our Soils: A Strategy for England.

[123] Natural England (2009) Technical Information Note 049 (TIN049) [online] available at: http://publications.naturalengland.org.uk/publication/35012 (Last accessed April 2017)

- **Severance:** The study area includes community facilities and connecting NMU routes within 250 metres of the scheme. For the basis of this assessment, community facilities include those outlined in the DMRB Volume 11 Section 3 Part 8 Chapter 2, such as doctor's surgeries, hospitals and medical facilities, schools, churches, leisure facilities (e.g. cinemas) and formal recreation facilities (e.g. parks, sports and recreation grounds, children's play areas and outdoor sports facilities). Shops include large shops such as supermarkets
- **Motorised Travellers view from the Road:** The study area considers views from the proposed route alignments
- **Driver Stress:** The study area consists the A303 and all side roads connecting to it within 250 metres of the scheme
- **Demolition of Private Property and Associated Land Take:** The assessment applies to direct effects of the Scheme on residential, industrial and commercial properties, including businesses such as independent shops. The assessment considers an area within 250 metres of the scheme boundary
- **Community Land and Community Facilities, and Development Land:** The study area is defined as the area within 250 metres of the scheme boundary
- **Local Economy:** The study area for the local economy is the District of South Somerset
- **Agricultural Land:** The study area for agricultural land as a National resource encompasses the ALC grade of land directly within the scheme footprint required to accommodate infrastructure associated with the scheme. The effects on individual farm businesses encompasses farms directly affected by the scheme during construction and operation

12.5 Existing baseline

NMU surveys

12.5.1 NMU counts were undertaken at 23 locations within the vicinity of the scheme. The scheme is situated within a rural area and given the associated potential for tourism and leisure, NMU trips surveys were undertaken on a summer school holiday day and term time day for comparison. Video surveys were undertaken for a 10-hour period (0800 to 1800) on Wednesday 31 August and Thursday 1 September 2016 to capture summer holiday flows and on Wednesday 14 September, Thursday 15 September and Friday 16 September 2016 to capture term time flows. The video surveys categorised flows for pedestrian, pedestrians with dogs, pedestrians pushing pram/ pushchair, wheelchair users, joggers / runners, cyclists, equestrians and other mobility impaired users.

12.5.2 A total of 142 NMUs were counted during the summer holidays and 79 during term time. The surveys identified 4 sites with counts of higher than 10 users per day, at Podimore High Street, Higher Farm Lane overbridge, Steart Hill and Sparkford Hall grounds. Please refer to Table 12.1 below for a summary of the NMU video counts.

12.5.3 Origin destination surveys were also commissioned at four locations including Right of Way (RoW) 3, RoW13, RoW15 and SR6. Please refer to the

assumptions and limitation section 12.8 of this report for further information on these surveys.

Table 12.1: 2016 NMU survey video counts during the summer holidays and term time

Survey location	Closest settlement	Neighbouring NMU facilities or side roads	Summer (August) NMU flows	Term- time (September) NMU flows
RoW1	Sparkford	WN 27/16	0	0
RoW2	Sparkford	WN 27/16	0	0
RoW3	Sparkford	WN 23/38	7 pedestrians, 12 pedestrians with dogs, 1 jogger	1 pedestrians, 5 pedestrians with dogs, 2 joggers
RoW4	Queen Camel	WN 23/12	N/A	N/A
RoW5	Queen Camel	WN 23/11	N/A	N/A
RoW6	Queen Camel	WN 23/14	N/A	N/A
RoW7	Queen Camel	WN 23/15	0	0
RoW9	Downhead	WN 23/37, WN 23/33, Celtic Way	0	1 cyclist, 2 equestrians
RoW10	Downhead	Y 27/19	2 pedestrians, 2 pedestrians with dogs	0
RoW11	Downhead	Y 27/ 10, Y 27/9, Footway adjacent to A303, Downhead Lane-side road	0	0
RoW12	Downhead	Y 27/9, Y 27/20	5 pedestrians, 1 pedestrian with dog, 1 equestrian	0
RoW13	West Camel	Y 27/6	0	0
RoW14	West Camel	Y 27/7	1 pedestrian	0
RoW15	Downhead	Y 27/ UN, Footway adjacent to A303	0	0
RoW16	Downhead	Y 27/26, Y 27/17	0	1 pedestrian
RoW17	Downhead	Y 27/26	N/A	N/A
RoW18	Downhead	Y 27/18, Downhead Lane – side road	0	0
RoW19	Podimore	Y 30/28	4 pedestrians	0
RoW20	Downhead	Y 30/28 Y 27/26	N/A	N/A
RoW21	Podimore	Y 30/UN, Y 30/29	11 pedestrians, 2 pedestrians with dogs	1 pedestrian with a dog
RoW22	Queen Camel	WN 23/32	N/A	N/A
RoW23	Queen Camel	WN 23/33, Celtic Way	0	0
RoW24	Podimore	Y 30/UN	1 pedestrian, 3 cyclists	0
SR1	Queen Camel	WN 23/10, Celtic Way, Gason Lane – side road	0	0
SR2	Queen Camel	Traits Lane – side road	2 pedestrians with dogs, 1 cyclist	1 pedestrian with a dog
SR3	Downhead	Steart Hill – side road	16 cyclists	1 pedestrian, 3 cyclists
SR4	West Camel	Howell Hill – side road	0	0
SR5	West Camel	Plowage Lane – side road	1 pedestrian, 3 cyclists	1 pedestrian with a dog, 1 cyclist
SR6	Podimore	Podimore high street – side road	17 pedestrians, 32 joggers, 17 cyclists	8 pedestrians, 28 joggers, 23 cyclists

Non-Motorised Users

12.5.4 PRoW to the north and south of the scheme consist of 24 footpaths, 2 bridleways and 2 restricted byways[124]. There is also one national cycle route[125], a long-distance path[126] and four footways[127] within the study area. Baseline conditions for NMUs have been established using an audit, which was undertaken in accordance with the DMRB standard HD 42/05. The environmental constraints plan (appendix A.1) provides a general overview of PRoW locations, however drawings to support the ES will detail each NMU route more precisely.

12.5.5 Table 12.2 below provides a description of each NMU facility within the study area.

Table 12.2: NMU amenities within the study area for the scheme

NMU facility	Facility type	Description	Distance from the scheme
WN 23/10	Footpath	Footpath intersects the A303 to the south, running between the west of Gason Lane and Blackwell Road to the south.	Within footprint
WN 23/11	Footpath	Footpath intersects the A303 to the south, passing east of Ridge Copse before running alongside Gason Lane to the south.	50m south
WN 23/12	Footpath	Footpath intersects the A303 to the north, running through Hazlegrove Park until it reaches the school access road 250m to the north of Sparkford junction.	Within footprint
WN 23/14	Footpath	Footpath intersects the A303 to the south, running through Ridge Copse.	30m south
WN 23/15	Footpath	Footpath running west of Gason Lane past the southern fringes of Ridge Copse and connecting to path WN 27/4 to the east.	150m south
WN 23/32	Footpath	Footpath intersects the A303 to the north, running between Camel Hill and Steart Hill.	Within footprint
WN 23/33	Footpath	Footpath intersects the A303 to the north, running between Camel Hill east of Camel Hill Farm to Newlands Lane in the north.	Within footprint
WN 23/37	Footpath	Connects PRoWs WN 23/32 and WN 23/33 at Camel Hill.	200m north
WN 23/38	Footpath	West of the existing A303 dual-carriageway at Sparkford, between Sparkford Hall and PRoW WN 23/12 in the west.	Within footprint
WN 27/14	Footpath	Runs between High Street and the railway in Sparkford.	150m east
WN 27/16	Footpath	Path between High Street Sparkford and Sparkford Hall, severed by the existing A303.	50m north east
WN 27/4	Footpath	Path between Ridge Copse and the A358 in the east.	200m south
WN 27/6	Footpath	Path between Wolfester Terrace, crossing the railway at Sparkford before connecting to Church Road.	100m S
Y 27/10	Footpath	Footpath intersecting the A303 to the north, running along Downhead Lane before heading west towards Glebe Farm.	Within footprint
Y 27/11	Footpath	Between the B3151 and Urgashay in the south.	20m east
Y 27/20	Restricted Byway	Slate Lane passes between Steart Hill and Downhead Lane, passing West Camel Hill.	Adjacent
Y 27/21	Footpath	Footpath intersects the A303 to the south, connecting to the B3151.	50m south
Y 27/22	Footpath	To the west of Slow Court Lane.	230m south
Y 27/27	Restricted Byway	Between Plowage Lane and Keep Street along Cottis Lane.	60m S
Y 27/29	Footpath	Between Plowage and Downhead Lane.	Within footprint

[124] Somerset County Council (2017) Explore Somerset Interactive Mapping, [online] available at https://roam.somerset.gov.uk/roam/map (last accessed November 2017)
[125] Sustrans (2017) National Cycle Network, [online] available at: https://www.sustrans.org.uk/ncn/map (Last accessed November 2017).
[126] The Walking Englishman (2017) Long Distance Footpath Directory [online] Available at: https://www.walkingenglishman.com/ldp/ldp.html (Last accessed November 2017)
[127] Google Maps (2017) [online] available at: https://www.google.co.uk/maps/@52.8382004,-2.3278149,6z (last accessed November 2017).

NMU facility	Facility type	Description	Distance from the scheme
Y 27/6	Footpath	Footpath intersects A303 to the south, between the church adjacent to the A303 and West Camel.	30m south
Y 27/7	Footpath	Footpath intersects the A303 to the south, between the A303 to the east of Plowage and Cottis Lane.	Adjacent
Y 27/9	Footpath	Footpath intersects the A303 to the north, between Plowage and Slate Lane, before connecting to Steart Hill 1km to the north.	Within footprint
Y 27/UN	Footpath	Footpath severed by the existing A303 to the west of Wayne's before connecting to Downhead.	Within footprint
Y 30/24	Footpath	Starting 100m east of Podimore Inn, moving south towards RNAS Yeovilton.	200m west
Y 30/28	Bridleway	Bridleway intersects the A303 to the north, along Eastmead Lane until Downhead Lane.	Within footprint
Y 30/29	Bridleway	Between Higher Farm Lane and Eastmead Lane.	40m north
Y 30/UN	Footpath	Between Podimore and Higher Farm Lane, running over the A303.	20m west
	Footway	Alongside Church Street in Podimore, starting at the main road which connects to the A303 to the southernmost fringes of Podimore.	110m south
	Footway	Runs adjacent to the south of the A303 between Howell Hill until Camel Cross.	Within footprint
	Footway	Footway along Wolfester Terrace to the north, between the A359 (north of services) and the A359 which heads to Queen Camel, both sides of the road.	100m east
	Footway	Footway between Wolfester Terrace and High Street Sparkford, either side of the road to the north of the Sparkford Inn.	Adjacent
Route 26	Cycle Route	National Route 26 runs from Portishead on the Somerset coast to Portland Bill on the Dorset coast via Wells, Castle Cary, Yeovil and Dorchester.	150m east
Celtic Way	Long distance path	The route visits more than 100 pre-historic sites through South Wales and the South West peninsula and includes 111 miles of the Land's End Trail.	Within footprint

Amenity

12.5.6 NMU facilities within the study area have been identified within Table 12.2 above. The environmental constraints plan contained within appendix A.1 provides a general overview of PRoW locations. Drawings will be prepared to support the ES which will detail each NMU route more precisely. At present, there is one crossing facility over the A303 for NMUs within the study area, at Higher Farm Lane to the north of Podimore, where amenity is considered to be good.

12.5.7 Existing worst-case amenity has been considered for each NMU facility. There are 11 PRoWs and 1 long distance route which intersect the A303 within the study area where amenity is considered to be very poor comprising PRoWs WN 23/10, WN 23/11, WN 23/12, WN 23/14, WN 23/32, WN 23/33, WN 27/16, Y 27/21, Y 27/9, Y 27/UN, Y 30/28 and the Celtic Way, as NMUs currently have to cross the A303 at uncontrolled crossings at-grade. Amenity is considered to be poor for 5 PRoWs comprising Y 27/11, Y 27/21, Y 27/6, Y 27/7 and Y 30/24, as well as 2 footways at A303 Howell Hill to Camel Cross and Footways – Sparkford, to Queen Camel and Route 26 with a lack of barriers between traffic and NMU facilities or routes conflicting with B-roads.

12.5.8 The current lack of barriers between people and traffic in the locations above may cause a fear of crossing the road, due to a feeling of it being unsafe.

12.5.9 Nine PRoWs WN 23/15, WN 27/14, WN 27/6, Y 27/10, Y 27/20, Y 27/22, Y 27/27, Y 27/29, Y 30/24 and one footway at Church St. Podimore connect to side roads and amenity is considered to be acceptable here, whilst 6 PRoWs

WN 23/37, WN 23/38, WN 27/4, Y 30/29, Y 30/UN (bridge solely used by NMUs) are completely separated from traffic and therefore amenity is good.

Severance

12.5.10 The scheme is located within the vicinity of several communities; Downhead and Camel Hill to the north of the A303, Sparkford to the east of the A303 and Queen Camel, West Camel and Podimore to the south of the A303.

12.5.11 NMU routes such as PRoW footpaths, bridleways, footbridges and cycle routes within 250 metres of the scheme are outlined above in the Non-Motorised Users section.

12.5.12 Community facilities and connective NMU facilities within 250 metres of the scheme are outlined in Table 12.3 and were identified using Google Maps[128].

Table 12.3: Community Facilities and connecting NMU Routes within 250m

Community Facility	NMU Routes Connecting to Community facility
The Podymore Inn public house	Footpath Y 30/UN Footpath Y 30/24 Bridleway Y 30/29 Bridleway Y 30/28
West Camel Methodist church	Footpath Y 27/6 Footpath Y 27/9 Footpath Y 27/10 Footpath Y 27/29 Restricted Byway Y 27/20
Sparkford Inn public house	Footpath WN 27/16 Footpath WN 27/14 Footpath WN 23/38

Driver stress

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

12.5.14 The single carriageway section runs between the Podimore Bypass (a dual-carriageway) and Hazlegrove Roundabout. There are a number of side roads which tie in to the existing A303 and provide access to the local community.

12.5.15 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 with in relation to the general standard of the road leads to driver frustration, and as such driver frustration is perceived to be high on the existing A303 between Sparkford and

[128] Google Maps (2017) [online] available at: https://www.google.co.uk/maps/@52.8382004,-2.3278149,6z (last accessed November 2017).

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 flow increased and inconsistent speeds.

12.5.16 Route uncertainty is considered to be low along the A303, given the presence of existing signage.

12.5.17 The accident rate on this section of the A303 is also higher than the national rate for A class trunk roads, with 162 accidents per billion vehicle kilometres travelled, compared to the national rate for all A road of 113 accidents per billion vehicle kilometres travelled. There is one NMU crossing over the A303, one footway alongside the A303 between Camel Cross and Howell Hill and approximately 16 points at which PRoWs intersect the A303 at-grade between Higher Farm Lane and Sparkford Hall, which NMUs do use, although in fairly low numbers (refer to Table 12.1). As such, the fear of potential accidents amongst vehicle travellers is considered to be Moderate.

12.5.18 Frustration amongst drivers on the A359, B3151 and side roads situated within the study area is likely to be low, with congestion largely marginalised to the A303 and therefore, vehicles can drive at speeds consistent with their own wishes.

Demolition of private property and associated land take

12.5.19 The area encompassing the scheme is predominantly rural, used for agriculture with some residential dwellings and businesses. Google Maps[129] and MAGIC[130] have been used to identify the baseline for this sub-factor

12.5.20 There is a farm adjacent to the A303 approximately 850 metres to the east of Podimore. At Camel Cross, there is a farm just north of the A303 on an unnamed road off Plowage Lane. In addition, Hawk House country lodging and bistro is situated adjacent to the south of the A303. At the intersection of Plowage Lane and the A303, there are 2 residential dwellings immediately south of the A303 and a derelict shed and residential property The Spinney north of the A303. Approximately 600 metres east of the Plowage Lane / A303 intersection, there are 2 residential properties, a bakery and West Camel Methodist church.

12.5.21 At the intersection of Steart Hill and the A303, there are 3 residential properties and Steart Road garage. Approximately 300 metres east of the Steart Hill/A303 intersection, there is a residential property Blue Haze adjacent to the A303.

12.5.22 At Camel Hill, there are 2 farms north of the A303, Camel Hill Farm and Vale Farm. There are also 4 residential properties in the vicinity of these 2 farms. South of the A303, along Traits Lane there is an electricity mast, buildings belonging to the Fleet Air Arm and 1 residential property Eyewell House.

[129] Google Maps (2017) [online] available at: https://www.google.co.uk/maps/@52.8382004,-2.3278149,6z (last accessed November 2017).
[130] [130] Defra (2017) MAGIC Online GIS Mapping System [online] available at: http://magic.defra.gov.uk (last accessed October 2017).

Adjacent to the south of the A303 just north of Gastons Lane is a Shell garage and Mattia diner.

12.5.23 At Hazlegrove Roundabout there is a service station with convenience shop and garage and a McDonalds. Just north of the roundabout along the east of the A303 is Long Hazel Dairy Farm and Long Hazel Park Campsite.

Community land and community facilities

12.5.24 Sparkford Cricket Club pitch is located in the study area. No other community land is present in the study area, based on a review of Google Maps[131].

12.5.25 Community facilities located in the study area include West Camel Methodist Church and St Peter's Church, based on a review of Google Maps[132].

12.5.26 A number of other community facilities, including a primary school, tennis club, bowls club, medical centre and Church are located outside the study area in Queen Camel (approximately 850 metres south of the scheme). Although Hazlegrove Preparatory School main building is approximately 465 metres north of the current A303, the sole private access to the school is currently via the Hazlegrove Roundabout. However, the school grounds and playing fields border the existing A303 and are therefore located within the study area.

Development land

12.5.27 The South Somerset Local Plan (2006-2028) does not identify any development sites within 250 metres of the scheme. However, the Local Plan outlines a target for the construction of at least 141 homes and 1.02 ha of employment land in Ilchester between 2006 and 2028[133].

Local economy

12.5.28 South Somerset has a population of 165,600, of whom 95,900 (58%) are of working age (16-64 years old). Children (aged under 16 years) make up 18% of the population, which is in line with the national average of 19%. Older people (over 65 years) comprise 25% of the general population, which is higher than the national average of 18%[134].

12.5.29 Table 12.4 below shows the economically active population and, amongst them, those who are in employment and those who are unemployed. It shows there are the same proportion of economically active people in South Somerset as nationally (78%). It also shows that unemployment in South Somerset is the same as the South West region (4%), meaning both are in line with the national

[131] Google Maps (2017) [online] available at: https://www.google.co.uk/maps/@52.8382004,-2.3278149,6z (last accessed November 2017).
[132] Google Maps (2017) [online] available at: https://www.google.co.uk/maps/@52.8382004,-2.3278149,6z (last accessed November 2017).
[133] South Somerset District Council (2015): 'South Somerset Local Plan 2006 – 2028'. See: https://www.southsomerset.gov.uk/media/707200/south_somerset_local_plan_2006-2028_adoption_version_march_2015.pdf
[134] ONS (2016): 'Population estimates – local authority based by five-year age band'. Accessed October 2017.

figure (5%). The South Somerset economically active population is the same as the national figure (78%), whilst the South West figure for the South West is slightly higher (81%).

Table 12.4: Employment and unemployment (April 2016 – March 2017)

All people	South Somerset	South Somerset (%)	South West (%)	Great Britain (%)
Economically active	80,000	78%	81%	78%
In employment	77,800	76%	77%	74%
Unemployed (Model-based)	2,800	4%	4%	5%

Source: ONS annual population survey (April 2016 - March 2017)

12.5.30 The English Indices of Deprivation 2015 are commonly used for the measurement and comparison of deprivation between neighbourhoods in England. In terms of deprivation, the study area contains three Lower layer Super Output Areas (LSOA) neighbourhoods, ranked 22,979, 16,939, and 20,669 out of 32,844 LSOAs in England, with 1 being the most deprived LSOA. This indicates that the scheme is located within the 50% least deprived neighbourhoods in the country.

Agricultural land

12.5.31 The land within the study area of the scheme is predominantly agricultural. Post 1988 ALC survey data is not available on MAGIC[135] therefore this ALC assessment will be based on 1975 Ministry of Agricultural Fisheries and Food (MAFF) ALC grades. 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 as Grade 3 (good to moderate) with a small amount of Grade 2 (very good quality) agricultural land.

Individual farm businesses

12.5.32 The land within the study area contains approximately 60 field parcels, predominantly separated by hedgerows and owned by numerous landowners, based on a review of OS Master Map data. 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, this is speculative.

12.6 Value (sensitivity of resources and receptors)

12.6.1 Criteria defining significance of effects are not outlined within DMRB Volume 11 Section 3 Part 6 or Part 8. However, DMRB Volume 11 Section 2 Part 5 provides an approach to determining significance of effects as outlined in Table 4.6 in chapter 4; relying on reasoned argument, professional judgement and the views of appropriate organisations. This also takes into account the value (sensitivity) of the receptor and the magnitude of impact, in accordance with Table 4.2 within this report.

[135] MAGIC [online] available at: http://magic.defra.gov.uk/ (last accessed November 2017).

12.6.2 Interpreting the guidance from DMRB, the effect categories have been allocated the following value (sensitivity) (Table 12.5). All NMUs are highly sensitive to change and are considered to be highly valued. Therefore, the descriptors included in the magnitude of change table also correspond to the overall significance of effects for both NMUs (refer to Table 12.6) and amenity (refer Table 12.7). Table 12.6 and Table 12.7 draw on the guidance set out in the DMRB Volume 11 Section 3 Part 8 Chapters 2, 6 and 9. The assessment of amenity also considers the criteria set out in sections 12.3.

12.6.3 For agricultural land, the value assigned is based on the ALC Grade and the magnitude of change is dependent on the area of land take (refer to Table 12.9). The significance of individual farm businesses, derived from professional judgement and interpreting the DMRB 11.3.8 Chapters 6 to 10, is based on the area of land take and proportion of land lost (refer to Table 12.9). Effects on severance of the land, husbandry, access and drainage for individual farm businesses will be considered within the ES, when more detailed design information will be available.

12.6.4 For severance, the significance of effects is derived from professional judgement, DMRB Volume 11 Section 3 Parts 6 and 8 and using Table 12.5 which considers the value of each receptor. Severance considers the effect of a scheme on key community facilities, primarily through assessing the effects on NMU routes connecting to these facilities, as described in DMRB Volume 11 Section 3 Part 8 Chapter 2, using guidance in DMRB Volume 11 Section 3 Part 8 Chapters 6 and 9. This assessment will use the magnitude criteria set out in Table 12.7 and Table 12.8 below to determine the effect on NMU routes connecting to key community facilities within the study area.

12.6.5 People are particularly sensitive to change and are vulnerable receptors with very little capacity and means to absorb changes. People are therefore considered to be highly valued for the assessment of demolition of private property and land take. This is based on professional judgement and aligns with the DMRB; however, this is in line with national policy which promotes good health and quality of life for people and requires applicants identify any ‘likely significant environmental impacts that would have an effect on human beings’ and ‘identify measures to avoid, reduce or compensate adverse health impacts as appropriate’ (paragraph 4.81 -4.82 of the NPSNN)’. Refer to sections 12.6.7 to 12.6.12 for further information describing the assessment for private property and associated land take, community land and community facilities, development land, and local economy.

12.6.6 Views from the road assesses only views from the new road during operation, and considers where any change in views are beneficial, (where there would be a shift in category from no view to restricted, intermittent or open view), adverse (where there would be a shift in category from open view towards intermittent, restricted or no view) or neutral (no change in view category). A Low, Moderate and High descriptive scale is used to provide a qualitative description on driver stress changes from the baseline for motorised travellers (MTs). The overall significance of effect is assessed using an on-balance approach.

Table 12.5: Value (sensitivity)

Effect Category	Value
Non-Motorised Users	High
Amenity	High
Agricultural land	Dependent on ALC (refer to Table 12.9)
Individual farm businesses	Dependent on area of land take
Severance	Low or medium (depending on the community facility severed)
Demolition of private property	High
Land take	High
View from the road	Low
Driver Stress	Low
Community land and development land	Dependent on magnitude criteria (refer to Table 12.12)
Community facilities	Dependent on magnitude criteria (refer to Table 12.12)
Local economy	Dependent on magnitude criteria (refer to Table 12.12)

Source: Derived by professional judgement and based on DMRB 11.3. 6, 11.3.8, and 11.3.9

Table 12.6: Impacts and magnitude of change on non-motorised users

Description of impacts on non-motorised users	Magnitude
• Substantially improve NMU network through the provision of new amenities for NMUs where none existed previously • Length of journeys decreased by over 500m	Major Beneficial
• Improve existing NMU network through the provision of new amenities for pedestrians and cyclists where few or none existed previously • Length of journeys decreased by 250-500m	Moderate Beneficial
• Improve existing NMU network through the upgrading of existing amenities or provision of new amenities for NMUs where some already exist. • Length of journeys decreased by up to 250m	Minor Beneficial
• Length of journeys not materially changed	Negligible Beneficial
• No change to journey length	No Change
• Length of journeys not materially changed	Negligible Adverse
• Improvements to existing NMU amenities are not provided • Length of journeys increased by up to 250m	Minor Adverse
• Existing NMU facilities are degraded • Length of journeys increased by 250 to 500m	Moderate Adverse
• Closure/ removal of NMU amenities where they previously existed • Length of journey journeys increased by over 500m	Major Adverse

Source: Derived using professional judgement and based on DMRB 11.3.8 Chapter 6

Table 12.7: Impacts and magnitude of change on amenity

Description of impacts on amenity	Magnitude
• Substantial improvement to NMU network through the provision of new amenities for pedestrians and cyclists where none existed previously.	Major Beneficial
• Improvement to a greater degree than Minor (determined through professional judgement) for the existing NMU network through the provision of new amenities for pedestrians and cyclists where few or none existed previously	Moderate Beneficial
• Improve existing NMU network through the provision of new amenities for pedestrians and cyclists where few or none existed previously	Minor Beneficial
• No change in facilities	No Change
• Pedestrian at-grade crossing of a new road carrying below 8000 vehicles per day (annual average daily traffic AADT) • A new bridge would need to be climbed or a subway traversed	Minor Adverse
• Pedestrian at-grade crossing of a new road carrying between 8,000 and 16,000 vehicles per day (AADT) in the opening year	Moderate Adverse
• Pedestrian at-grade crossing of a new road more than 16,000 vehicles per day (AADT) in the opening year	Major Adverse
• Description of impacts on amenity	Magnitude
• Substantial improvement to NMU network through the provision of new amenities for pedestrians and cyclists where none existed previously.	Major Beneficial

Source: Derived using professional judgement and based on DMRB 11.3.8 Chapter 6

Table 12.8: Value and magnitude assigned to the assessment of Agricultural Land as a National resource

		Magnitude		
		Land take		
Grade	Value	>20ha	<20ha	Indirect
1 and 2	High	Major Adverse	Moderate Adverse	Minor Adverse
3a	Medium	Moderate Adverse	Minor Adverse	Minor Adverse
3b and 4	Low	Minor Adverse	Minor Adverse	Minor Adverse

Source: derived by professional judgement and based on DMRB 11.3.6 Chapters 6-10

Table 12.9: Value and magnitude assigned to the assessment of individual farm businesses

Land take from individual farm business	Value	Magnitude		
		25% permanent land lost and/or access severely severed	10 - 24% permanent land lost and/or access partially severed	1-9% permanent land lost and/or minor access severed
Total area < 20ha and/or limited or highly specific range of high-value crops/livestock and low operational flexibility	High	Large or very Large Adverse	Moderate or Large Adverse	Slight or Moderate Adverse
Total area 20-50 ha and/or some diversification or range of crop/livestock types	Medium	Large or Moderate Adverse	Moderate Adverse	Slight Adverse
Total area >50ha and/or highly diversified income and flexible management	Low	Slight or Moderate Adverse	Slight Adverse	Neutral or Slight Adverse

Source: Derived using professional judgement and based on DMRB 11.3.6 Chapters 6-10

Private property and associated land take, community land and community facilities, development land, and local economy

12.6.7 For the sub-topics of private property and associated land take, community land and community facilities, development land, and local economy receptors include:

- Residents in the immediate area of the scheme
- Landowners in the immediate area of the scheme
- Local employers and businesses in the area
- Employees and job-seekers, particularly those who live locally
- Users of community facilities in nearby villages, such as educational establishments, health facilities, recreational facilities, places of worship and public transport

12.6.8 Resources include existing and potential:

- Residential properties and business premises
- Residential, business, community and development land affected by the scheme, construction works, and compounds
- Community facilities and services including, for example, public transport, hospitals and community health facilities, primary and secondary schools, nurseries, places of worship and leisure and recreation services

12.6.9 The sensitivity of these receptors and resources is governed by their capacity to absorb changes arising from the scheme. It ultimately reflects their vulnerability to the impacts of the proposed activities and their access to additional or

alternative resources of a similar nature. If a resource is frequently used, if few alternatives exist, or if receptors have limited capacity to absorb the changes arising from the scheme, that receptor is considered to be sensitive to the changes. Criteria describing the sensitivity of receptors are identified Table 12.10.

Table 12.10: Socio-economic sensitivity criteria

Sensitivity	
High	• An already vulnerable receptor with very little capacity and means to absorb changes. • No alternative facilities, access arrangements or opportunities are available within an easily accessible distance • A highly or frequently accessed resource
Medium	• A non-vulnerable receptor with limited capacity and means to absorb changes • A limited range of alternative facilities, access arrangements or opportunities are available within an easily accessible distance • A moderately, or-semi-frequently accessed resource
Low	• A non-vulnerable receptor with sufficient capacity and means to absorb changes • A wide range of alternative facilities, access arrangements or opportunities are available within an easily accessible distance • An infrequently accessed resource

12.6.10 To assess the magnitude of an impact on these receptors and resources, each impact arising is assessed in terms of the following indicators:

- Spatial scope – whether impacts are likely to be felt within the proposed scheme boundary, within the Local Impact Area (LIA) which extends to 250 metres from the scheme boundary (refer to section 12.4) or Wider Impact Area (WIA) which extends to the District of Somerset, or more widely
- Extent – how many social and community resources and receptors are likely to be impacted
- Duration – whether the impacts would be short or long-term
- Reversibility – whether the impact is permanent or temporary

12.6.11 Taking these indicators into consideration, and also any mitigation measures that can be applied; the criteria are used as guidelines to assess the magnitude of each impact. This is described in more detail in Table 12.11.

Table 12.11: Socio-economic and community impact magnitude criteria

Magnitude	Criteria guidelines
Major	• Affects receptors within the WIA and beyond • Affects the well-being of many receptors (or the well-being of a few receptors in an acute way for an extended period) • Affects receptors for an extended period (e.g. the majority of the construction period or is permanent) • Requires considerable intervention to return to the baseline
Moderate	• Affects either the well-being of receptors beyond the site boundary into the LIA • Affects the well-being of a moderate number of receptors • Continues over a number of years, but the baseline is re-established quickly • May require some intervention to return to the baseline conditions
Minor	• Affects the well-being of a small number of receptors • Occurs exceptionally, mostly within the site boundary • Does not extend beyond the life of the scheme (the end of the construction period or first year of operation) • Baseline returns naturally or with limited intervention within a short timescale
Negligible	• Localised to a specific location within the site • Temporary or unlikely to result in detectable impact on the well-being of people or a socio-economic resource • Considered to be a risk that is manageable with intervention • Baseline remains consistent

12.6.12 The significance of any potential effects is evaluated by combining the assessment of magnitude of each impact and the sensitivity of the receptor or resource; effects can be beneficial or adverse. The significance of effect is then determined using Table 4.2. For the purposes of the assessment, effects that are Moderate, Large, or Very Large are considered significant.

12.7 Consultation

12.7.1 A meeting was held with Somerset County Council's Rights of Way Officer on 28 November 2016. Key points discussed at the meeting included requirements for the Celtic Way; which is not promoted as a long-distance walk by the Council, good spacing for NMU crossings, requirements for right of way diversions and provisions for grade-separated crossings. A previous meeting was held with Somerset County Council in January 2016. Initial consultation was also held with stakeholder user groups, with the Blackmore Vale and Yeo Valley CTC, Somerset Ramblers and South Somerset Bridleways Association providing feedback in early 2016.

12.8 Assumptions and limitations

12.8.1 Assumptions made with regard to the People and Communities assessment are as follows:

- Given the uncertainties associated with the NMUs, amenity, severance, agricultural land and demolition of private property and associated land take subtopics, the significance of effects has not been considered at this stage for human health and wellbeing. This will be assessed in further detail as part of the ES once further design information is available.
- Origin destination surveys were undertaken in August and September 2016 and also in April 2017 for 1 location. The 2016 results proved to be inconclusive with only 4 interviews attempted and 1 conducted for the 4 locations. It was decided that interview surveys should be carried out for a second time to the east of Hazlegrove House (at RoW 3). Tracsis carried out the additional surveys on a weekday and weekend day in April 2017. Six interviews were attempted and 5 conducted, although all

attempts were not undertaken on the PRoWs, rather on a desire line in a nearby field.

- The assessment of agricultural land is limited by the availability of specific information regarding the ALC Grades. As ALC grades are not available on MAGIC, the indicative MAFF 1975 ALC data are used, however as these grades are not derived from assessment they cannot be taken as the true ALC of the agricultural land.
- Full information on the uses of the agricultural land such as land use information, the nature of activities associated with the land and farm buildings and infrastructure is not fully known at this stage.
- Landowner information was collated using land registry data and in some cases field boundaries may be out of date or incorrect.
- Full information on the uses of the agricultural land such as the type of husbandry, severance and major accommodation works is not known at this stage and would be obtained as part of the assessment to inform the ES through an agricultural questionnaire to landowners. The assessment of the effect on individual farm business is limited to an assessment of the approximate land take and the proportion of land lost to the business.
- Information on community facilities has been primarily based on desk-based research using Google Maps. This may not contain the most up to date information therefore the list of community facilities outlined in section 12.5 should be viewed as an indication of provisions rather than a comprehensive assessment of provisions.
- Traffic data has not been used to support the Simple assessments for amenity and driver stress. Therefore, the assessments are qualitative in nature and will be assessed in further detail in the ES.
  At this stage, Private Property, Local Economy and Community Land assessments have only been undertaken to a DMRB Scoping level. These assessments will be considered in greater detail within the ES.

12.9 Design, mitigation and enhancement measures

Construction

12.9.1 Mitigation measures of relevance during construction include the following:

- A Construction Environmental Management Plan (CEMP) would be prepared by the appointed Contractor and implemented during the construction period. The CEMP would ensure that the construction of the scheme is undertaken in as sensitive a manner as possible, with regards to people within the local community.
- A Traffic Management Plan (TMP) would be implemented during the construction phase of the scheme. The TMP would ensure that access is maintained and disruption is minimised wherever practicable, and would include measures to minimise severance by ensuring diversions for pedestrians are well signed, alternative access arrangements are made, and access to properties are retained.
- Effects upon NMUs would be minimised through ensuring that all temporary diversions for users of NMU amenities around the work site are clearly signed, with alternative access arrangements maintained through the full construction period, as required.

- Reinstatement measures would be implemented if agricultural land during the construction phase is altered, damaged or lost, ensuring that land is reinstated to its previous ALC grade prior to works commencing.
- On-going consultation to take into account the individual needs of landowners and inform mitigation design if agreed, such as the location of replacement access points.
- Compensation would be explored for landowners should agricultural land, individual farm businesses and private property currently in use be directly affected during construction of the scheme, through the Compulsory Purchase Acquisition mechanism.
- Management of soils: In areas of land which would be temporarily acquired, soils would be managed in accordance with Defra (2009) 'Construction Code of Practice for the Sustainable Use of Soils on Construction Sites' whilst a Soil Handling and Management Plan will be followed which will include details of how agricultural land will be restored at the end of construction.

Operation

12.9.2 Mitigation measures of relevance during operation include the following:

- An NMU strategy has been produced 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 PRoWs to be extinguished.
- For individual farm businesses adversely affected by the scheme through loss of farm access points, replacement access would be provided.
- Compensation would be explored for landowners should agricultural land, individual farm businesses and private property currently in use be directly affected during operation of the scheme, through the Compulsory Purchase Acquisition mechanism.

12.10 Assessment of effects

Construction

Human health and wellbeing effects

12.10.1 The temporary closure or diversions of NMU facilities during construction has the potential to result in temporary increases in journey times and lengths for NMUs which would increase levels of physical activity for NMUs. Any temporary journey length increases would be considered beneficial in terms of effects on human health and wellbeing, with a reduction in risk of relative all-cause mortality. Wellbeing and therefore a person's state of feeling comfortable and happy, could be temporarily affected through the presence of construction related machinery, lighting and changes in traffic flows. Temporary severance to routes connecting to community facilities and the subsequent enjoyment of using these facilities, as well as temporary impacts to private property / businesses could cause stress and health issues for people. Refer to section 12.8 for the assumptions and limitations regarding the assessment of human health and wellbeing.

Non-motorised users

12.10.2 Slight Adverse effects are predicted for 12 PRoWs WN 23/10, WN 23/12, WN 23/32, WN 23/33, WN 23/38, Y 27/10, Y 27/20, Y 27/29, Y 27/7, Y 27/9, Y 27/UN, Y 30/28, the Celtic Way and 2 footways between Sparkford to Queen Camel and Howell Hill to Camel Cross with construction works resulting in temporary journey length and time increases. No effects are anticipated for 16 PRoWs WN 23/11, WN 23/14, WN 23/15, WN 23/37, WN 27/14, WN 27/16, WN 27/4, WN 27/6, Y 27/11, Y 27/21, Y 27/22, Y 27/27, Y 27/6, Y 30/24, Y 30/29, Y 30/UN, Route 26 cycle route and a footway at Church Street, Podimore.

12.10.3 Mitigation measures such as the creation of diversions routes (refer to section 12.9) would be implemented, to ensure that users of these facilities would not be significantly affected.

12.10.4 A temporary on balance Slight Adverse effect is anticipated for NMUs as a result of the scheme. This is not considered to be significant.

Amenity

12.10.5 As stated in section 12.5, 12 PRoWs, 2 footways and a long-distance route would be temporarily affected during construction and therefore existing barriers between people and traffic are likely to be altered. Subsequently footpath widths could be changed, NMUs could be moved closer to traffic and barriers including street furniture and planting temporarily may be removed, to allow for construction traffic. Therefore, construction works could alter peoples' perception of fear and safety and detrimentally affect the pleasantness of journeys for people for a temporary period. However, the provision of mitigation described in section 12.9 would ensure that effects on people and the local community are minimised.

12.10.6 As such, an overall Slight Adverse effect on amenity is predicted for the scheme. This is not considered to be significant.

Severance

12.10.7 The severance of NMU routes and potential effects on access to community facilities are assessed in Table 12.12. Taking an on-balance approach, it is anticipated that there would be a Slight Adverse effect on NMU access to community facilities during construction.

Table 12.12: Severance assessment for the scheme

Community facility	NMU route connecting to community facility	Effect during construction and operation
The Podymore Inn public house	Footpath Y 30/UN Footpath Y 30/24 Bridleway Y 30/29	There would be no change to these footpaths.
	Bridleway Y 30/28	This bridleway would experience a minor adverse change in journey length and time. This bridleway recorded a small number of NMUs in the NMU count, indicating that the bridleway is used. Mitigation is therefore important.
West Camel Methodist church	Footpath Y 27/6	There would be no change to this footpath.
	Footpath Y 27/9 Footpath Y 27/10 Footpath Y 27/29	These footpaths would experience a minor adverse change in journey length and time. Footpath Y 27/9 recorded a number of NMUs in the NMU count.
	Restricted Byway Y 27/20	This byway would experience a negligible adverse change in journey length and time. This byway recorded a number of NMUs in the NMU count.
Sparkford Inn public house	Footpath WN 27/16 Footpath WN 27/14	There would be no change to these footpaths
	Footpath WN 23/38	This footpath would experience a minor adverse change in journey length and time. This footpath experienced a high number of NMUs in the NMU survey count, indicating that the footway is regularly used and therefore the importance that any adverse effects should be mitigated against.

Driver stress

12.10.8 During construction, vehicles would need to travel through road works within the scheme area, with associated delays to journey time due to congestion and heavily fluctuating traffic flows. At this early stage of design, traffic management is likely to be temporarily required on the A303 between March 2020 and February 2023 and adjoining side roads, which would comprise temporary speed limits and narrow lanes. The presence of roadworks and traffic management is likely to cause an increase in driver frustration along the A303, A359, B3151 and adjoining side roads, and result in an increase in the fear of accidents for vehicle travellers who use these roads. The provision of temporary signage would minimise route uncertainty amongst vehicle travellers.

12.10.9 Given the increases in driver frustration and fear of accidents, driver stress is likely to be High along the A303 and A359 during construction and Moderate along the B3151, and would increase from the baseline. Driver stress is not predicted to increase on side roads connecting to the A303.

12.10.10 Taking into account the comprehensive TMP which would be implemented, diversions that are adequately signposted and a phasing plan, the overall changes in driver stress during construction of the scheme are considered to be not significant and a temporary Slight Adverse effect is predicted.

Demolition of private property and associated land take

12.10.11 There is the potential for adverse effects as a result of the scheme, relating to the demolition of one farm building approximately 850m to the east of Podimore and also the requirement for land take from private property. However, as the full details of the construction footprint are not yet known, specific details on demolition and land take will be included as part of the ES.

Community Land and Community Facilities

12.10.12 Based on an initial scoping exercise, during construction, the scheme would result in traffic management measures, which may result in temporary speed reductions, temporary traffic lights, and single direction traffic. This could increase journey times and therefore affect those travelling to community facilities, such as the 2 churches within the study area.

12.10.13 Although Hazlegrove Preparatory School is located outside of the 250m study area, the sole private access to the school is currently via the Hazlegrove Roundabout, which falls within the study area. The scheme would permanently change this access to the school, which would potentially cause disruption to the community facility.

Local economy

12.10.14 Based on an initial scoping exercise, the scheme would require new construction workforce, which if local, could have a beneficial effect on employment rates. However, because of the size of the scheme, this effect is unlikely to be significant.

12.10.15 For the duration of the construction phase, there would be construction workers on-site. It is anticipated that there would be a slight and indirect temporary beneficial effect on the local economy as a result of these workers using local facilities, for example hospitality and catering establishments. This effect is also unlikely to be significant as any uplift would be minor for a scheme of this size, taking into account the mitigation described in section 12.9.

Agricultural land as a national resource

12.10.16 The need for temporary associated agricultural land take along the scheme is likely, therefore there is the potential for adverse effects. However, in the absence of construction information, the extent of agricultural land acquisition during construction will be determined as part of the on-going assessment and reported within the ES.

Individual farm businesses

12.10.17 The acquisition of temporary land take belonging to individual farm businesses is likely therefore there is the potential for adverse effects. However, as the construction footprint is unknown at this stage, the extent of land take of individual farm businesses will be determined as part of the on-going assessment and reported within the ES.

Operation

Human health and wellbeing effects

12.10.18 Permanent changes to NMU facilities have the potential to alter journey times and lengths for NMUs which would permanently increase levels of physical activity of NMUs in the area. Any permanent journey length increases would be considered beneficial in terms of human health and wellbeing, with a

reduction in all-cause mortality. Conversely, journey length decreases which could occur through provision of new and improved facilities would result in adverse effects on human health and wellbeing. Wellbeing, and therefore a person's state of feeling comfortable and happy, would be permanently affected through any potential changes in amenity due to changes in exposure to traffic. Severance to routes connecting to community facilities and the subsequent enjoyment of using the facilities and permanent impacts to private property and associated businesses could cause stress and health issues for people. Refer to section 12.8 for the assumptions and limitations regarding the assessment of human health and wellbeing.

Non-motorised users

12.10.19 Approximately 16 NMU facilities could be directly affected by the scheme, with permanent changes to journey length, provision of new facilities or degradation to existing facilities for NMUs. An NMU strategy has been developed alongside the scheme design, following consultation with the public, Somerset County Council's Right of Way Officer and stakeholder groups and taking into account NMU counts (refer to section 12.9), which would comprise new facilities for NMUs in operation.

12.10.20 No change in journey length or facilities are predicted for PRoWs WN 23/14, WN 23/15, WN 23/37, WN 27/14, WN 27/4, WN 27/6, Y 27/11, Y 27/20, Y 27/21, Y 27/22, Y 27/27, Y 27/6, Y 30/24, Y 30/29, Y 30/UN, Route 26 Cycle Route and footway Church St. Podimore.

12.10.21 Based on the assessment in Table 12.13, an on-balance Slight Adverse effect is anticipated on NMUs as a result of the scheme. This is not considered to be significant.

Table 12.13: Significance of effects for NMUs during operation

NMU amenity reference	Commentary	Change to journey length	Change to and within the vicinity of NMU facilities	Significance
PRoW WN 23/10	Potential for significant change in journey length for NMUs. The provision of new facilities would minimise adverse effects for NMUs.	Major Adverse	Slight Beneficial	Moderate Adverse
PRoW WN 23/11	No change in journey length or facilities.	No change	No change	Neutral
PRoW WN 23/12	This PRoW would be extinguished resulting in significant change in journey length in a registered park and garden. The provision of new facilities nearby would minimise adverse effects for NMUs.	Major Adverse	Slight Beneficial	Moderate Adverse
PRoW WN 23/32	Potential for significant change in journey length for NMUs. The provision of new facilities would be considered beneficial for NMUs.	Major Adverse	Slight Beneficial	Moderate Adverse
PRoW WN 23/33	Potential for significant change in journey length for NMUs. The provision of new facilities would minimise adverse effects for users of the PRoW. Low NMU flows were recorded here.	Major Adverse	Slight Beneficial	Moderate Adverse
PRoW WN 23/38	Potential journey length increases and decreases for NMUs. The provision of a new NMU crossing would be a major improvement for NMUs as the previous crossing was unsafe. Notable NMU flows were recorded here.	Minor Adverse	Major Beneficial	Large Adverse

NMU amenity reference	Commentary	Change to journey length	Change to and within the vicinity of NMU facilities	Significance
PRoW WN 27/16	This PRoW would be extinguished, potentially resulting in significant journey length increases for NMUs. As this PRoW would be extinguished and there would be a loss of facilities here a Major Adverse effect is predicted.	Major Adverse	Major Adverse	Large Adverse
PRoW Y 27/10	This PRoW would be diverted resulting in no journey length change. The provision of a new route towards Camel Hill and crossing towards Plowage Lane would be considered a major improvement for NMUs in this location.	No change	Major Beneficial	Large Beneficial
PRoW Y 27/29	This PRoW would be diverted resulting in no change to journey length. The provision of a new route towards Camel Hill and crossing to Plowage Lane would be considered a major improvement.	No change	Major Beneficial	Large Beneficial
PRoW Y 27/7	No change in journey length or facilities.	No change	No change	Slight Adverse
PRoW Y 27/9	Part of the PRoW would be extinguished resulting in negligible journey length changes. As this PRoW would be extinguished and there would be a loss of facilities here a Major Adverse effect is predicted.	Negligible Adverse	Major Adverse	Large Adverse
PRoW Y 27/UN	This PRoW would be extinguished and NMUs would be required to cross the A303 at Downhead which would considerably add to journey lengths. No NMUs were recorded, however this option would result in a degradation to NMU facilities.	Major Adverse	Major Adverse	Large Adverse
PRoW Y 30/28	Part of the PRoW would be extinguished and NMUs would be unable to cross the A303, resulting in large journey length increases. Low NMU flows were recorded here, whilst a new NMU route would be provided south of the A303.	Major Adverse	Minor Beneficial	Slight Adverse
Footway – A303 Howell Hill to Camel Cross	Potential for this footway to be partially located within the option footprint and currently there are no plans to improve it. The provision NMU crossing facilities would be considered an improvement.	No change	Slight Adverse	Slight Adverse
Footway – Sparkford to Queen Camel	No change to journey length for users of this footway. New routes would connect to this footway improving connections.	No change	Slight Beneficial	Slight Beneficial
Celtic Way	Potential for significant change in journey length for NMUs. The provision of new facilities would minimise adverse effects for NMUs.	Major Adverse	Slight Beneficial	Moderate Adverse

Amenity

12.10.22 During the operation of the scheme, the pleasantness of journeys experienced by NMUs is anticipated to change in a number of different ways. Several sections of the existing A303 would be closed to traffic, such as between the existing Hazlegrove junction and Howell Hill, and other sections of the existing A303 would be handed over to the local authority, such as between Plowage and Camel Cross. New NMU facilities would be provided as outlined in the NMU Strategy, which would improve amenity for NMUs. Table 12.14 below provides a high-level assessment of change in amenity for NMU facilities taking into account potential mitigation measures (refer to section 12.9).

12.10.23 No change in amenity is predicted during operation for PRoWs WN 23/37, PRoW WN 23/38, WN 27/14, WN 27/4, WN 27/6, Y 27/22, Y 27/27, Y 30/24, Y 30/29, Y 30/UN, Route 26 cycle route, footways at Church St. Podimore and Sparkford, to Queen Camel.

12.10.24 Based on the assessment in Table 12.14 below, an on balance Moderate Beneficial effect is anticipated on NMUs as a result of the scheme. This is considered to be significant.

Table 12.14: Change in amenity for facilities during operation

NMU facility	Change in amenity in operation	Significance
PRoW WN 23/10	Amenity improved from very poor to acceptable with PRoWs diverted along a new side road between Hazlegrove junction and Camel Hill.	Moderate Beneficial
PRoW WN 23/11	Amenity improved from very poor to poor with a new route provided alongside the stopped up existing A303 and the PRoW diverted over bridge to the east, however NMUs would still be required to cross the A359 at-grade.	Slight Beneficial
PRoW WN 23/12	This PRoW would be extinguished, with a new crossing provided to the east.	Large Beneficial
PRoW WN 23/14	This A303 section would be stopped up for traffic and therefore amenity would improve from very poor to good.	Large Beneficial
PRoW WN 23/15	Gason Lane would no longer connect to the A303, so a reduction in traffic and slight improvement in amenity would be anticipated, although this would remain as acceptable.	Slight Beneficial
PRoW WN 23/32	Amenity improved from very poor to acceptable with this PRoW diverted along a new side road between Hazlegrove junction and Camel Hill.	Moderate Beneficial
PRoW WN 23/33	Amenity improved from very poor to acceptable with this PRoW diverted along a new side road between Hazlegrove junction and Camel Hill.	Moderate Beneficial
PRoW WN 27/16	This PRoW would be extinguished.	Large Adverse
PRoW Y 27/10	The slip roads for the new road would be brought closer to PRoW slightly reducing amenity from acceptable to poor.	Slight Adverse
PRoW Y 27/11	This section of the B3151 would be stopped for traffic and therefore amenity would improve from poor to good.	Large Beneficial
PRoW Y 27/20	The slip roads for the new road would be brought closer to PRoW slightly reducing amenity from acceptable to poor.	Slight Adverse
PRoW Y 27/21	This section of A303 would become a local road meaning a reduction in traffic and slight improvement in amenity from very poor to poor.	Slight Beneficial
PRoW Y 27/29	The slip roads for the new road would be brought closer to PRoW slightly reducing amenity from acceptable to poor.	Slight Adverse
PRoW Y 27/6	This section of A303 would become a local road meaning a reduction in traffic and slight improvement in amenity from poor to acceptable.	Slight Beneficial
PRoW Y 27/7	This A303 section would be stopped up for traffic and therefore amenity would improve from very poor to good.	Large Beneficial
PRoW Y 27/9	Amenity improved from very poor to acceptable with this PRoW diverted over bridge.	Moderate Beneficial
PRoW Y 27/UN	This PRoW would be extinguished.	Large Adverse
PRoW Y 30/28	PRoWs would be diverted and the existing crossing extinguished so amenity would improve from very poor to good.	Large Beneficial
Footway – A303 Howell Hill to Camel Cross	This section of A303 would become a local road meaning a reduction in traffic and slight improvement in amenity from poor to acceptable.	Slight Beneficial
Celtic Way	Amenity improved from very poor to acceptable with PRoWs diverted along a new side road between Hazelgrove junction and Camel Hill.	Moderate Beneficial

Severance

12.10.25 The severance of NMU routes and potential effects on access to community facilities are assessed in Table 12.12. Taking an on-balance approach, it is anticipated that there would be a Slight Adverse effect on NMU access to community facilities during the operation of the scheme.

Motorised travellers view from the road

12.10.26 The scheme would be online and adjacent to the existing A303 and is situated in a heavily rural landscape, with agricultural land dominating the scene away from the A303, although the existing A303 does form a prominent feature throughout its length. No view to the wider area is anticipated for motorised travellers between Camel Cross and Conegore Corner, with the new road set in cutting for approximately 1.5km. For the section in cutting, overbridges would be visible for motorised travellers. The new junction at Hazlegrove would be grade-separated and at this location motorised travellers would be able to see overbridges, mitigation planting, earth bunds and acoustic fencing.

12.10.27 The section of new road between Conegore Corner and Camel Hill would be on an embankment, with overbridges provided at several locations along the length of the route. Mitigation planting would be provided alongside the scheme, which would gradually establish over time, eventually screening any open views to the wider area, such as along the ridgeline between Sparkford and Podimore. The provision of bunds, the presence of field boundaries, hedgerows and acoustic fencing would further limit views for vehicle travellers and result in a Restricted view. Nonetheless, there would still be some far-reaching views to the wider area for vehicle travellers between Podimore and Conegore Corner and also at Camel Hill, to a high-quality landscape.

12.10.28 An overall Slight Beneficial effect is anticipated for vehicle travellers with open views from the new road where they were previously restricted, although as mitigation planting establishes over time effects would gradually dissipate to Neutral.

Driver stress

12.10.29 In the first 15years after opening driver stress is predicted to decrease along the A303, with reduced congestion and decreased levels of driver frustration, with vehicle travellers able to drive along the road at a more consistent speed, giving improved journey time reliability, particularly with vehicles no longer required to stop at Hazlegrove junction travelling along the A303. The fear of potential accidents is also predicted to improve with a new safety barrier provided and NMUs moved off the network with the provision of new crossing facilities, and a predicted improvement in the accident record. Route uncertainty has not been considered at this stage, although it is anticipated that this would generally improve through the provision of new signage and gantries designed to align with current standards and methodology (i.e. reduced clutter, clear messages and inform travellers). Driver stress is predicted to decrease from High to Low during operation of the scheme, predominantly due to vehicles able to travel at consistent speeds, along with a reduction in fear of potential accidents and route uncertainty.

12.10.30 An overall Moderate Beneficial effect is anticipated once in operation for driver stress. This is considered to be significant.

Demolition of private property and associated land take

12.10.31 Potential demolition and land take would be required to construct the scheme and therefore potential effects are considered for the construction phase only. Therefore, this sub-factor has been scoped out of further assessment for effects during operation.

Community land and community facilities

12.10.32 Based on an initial scoping exercise, it is not anticipated that community land would be affected; however, with regards to community facilities, the scheme would result in relief from congestion on the local road network, which is likely to improve access to community facilities in the study area, in terms of journey time.

12.10.33 Although Hazlegrove Preparatory School is located outside of the 250m study area boundary, the sole private access to the school is currently via the Hazlegrove Roundabout, which falls within the study area. The scheme would re-route access to the school, with a new slip road provided from a new grade-separated junction. During operation, there is therefore potential for access to the school to be improved. The creation of an additional junction separate to the A303 would separate traffic for the school from general vehicular traffic. This could also ease congestion around the entrance to the school, thereby improving access.

Local economy

12.10.34 Based on an initial scoping exercise, direct operational employment is not expected to be created as a result of the scheme. However, there are likely to be increased indirect employment opportunities related to reduced congestion and improved journey times.

Agricultural land as a national resource

12.10.35 The scheme would require the land take of approximately 40 hectares of agricultural land indicated by the MAFF as ALC Grade 3. According to Table 12.8, this would result in a Moderate Adverse effect.

Individual farm businesses

12.10.36 There are approximately 22 farms with the potential to be directly affected by the proposed scheme. It is anticipated that this would result in an overall Moderate Adverse effect, due to severance of land use for agricultural purposes and permanent land take requirements.

12.10.37 Compensation would be explored for landowners should agricultural land, individual farm businesses and private property currently in use be directly affected during construction of the scheme, through the Compulsory Purchase Acquisition mechanism and will be reported in the ES.

12.11 Additional monitoring requirements

12.11.1 Monitoring requirements will be explored as part of the on-going assessment and reported within the ES following the assessment of effects on human health and wellbeing and further discussions with land-owners and the community.

12.12 Conclusions

Human health and wellbeing

12.12.1 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.

12.12.2 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.

Non-motorised users

12.12.3 Journey length and time are predicted to temporarily increase for a number of NMU facilities during construction resulting in a Slight Adverse effect for NMUs. During operation, some benefits and adverse effects are predicted to occur, due to increase or decreases in journey length, provision of new facilities or degradation to existing facilities. On balance, a Slight Adverse effect has been predicted.

Amenity

12.12.4 During construction, existing barriers between people and traffic would change resulting in a Slight Adverse effect on amenity. Once in operation, amenity would change in a number of ways, with barriers between people and traffic changed, changes in flows and provision of new facilities. The scheme would result in a Moderate Beneficial effect on amenity on balance.

Severance

12.12.5 A number of NMU routes connecting to community facilities would experience Slight Adverse effects to journey time and quality during both construction and operation.

Motorised travellers view from the road

12.12.6 The scheme 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 with a shift from restricted views to with open views in part from the new road.

Driver stress

12.12.7 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 TMP would minimise effects on vehicle travellers. During operation, a Moderate Beneficial effect is predicted with vehicle travellers able to drive along the road at a more consistent speed, and improved journey time reliability.

Demolition of private property and associated land take

12.12.8 Due to the absence of construction information, demolition of private property and associated land take for the scheme is unknown.

12.12.9 Effects on private property and land take would occur only during the construction phase of the scheme, and would dissipate during the operation phase, and therefore effects on demolition of private property and associated land take would be Neutral during operation.

Community Land and Facilities

12.12.10 A scoping exercise has been undertaken for the community land and facilities sub-factor, which noted potential changes to journey times and to access to community facilities during construction and operation.

Local economy

12.12.11 A scoping exercise has been undertaken for the Local Economy sub-factor, which noted the potential creation of jobs as a result of the scheme during construction.

12.12.12 During operation, permanent jobs are not anticipated to be created.

Agricultural land

12.12.13 Due to the absence of construction information, effects on agricultural land during construction cannot yet be deduced though there is the potential for agricultural land take resulting in potential adverse effects. Due to the ALC grade and size of required land take for scheme operation, a Moderate Adverse effect is anticipated.

Individual farm businesses

12.12.14 Due to the absence of construction information, effects on individual farm businesses during construction cannot yet be deduced though there is the potential for land take resulting in potential adverse effects.

12.12.15 Due to the number of land parcels anticipated to experience a significant magnitude of land take, particularly small land parcels, a Moderate Adverse effect is anticipated.

13 Road drainage and the water environment

13.1 Introduction

13.1.1 This chapter presents the ongoing work for the assessment of the potential effects of the scheme upon the water environment, during both construction and operation. The assessment has been undertaken in accordance with Design Manual for Roads and Bridges (DMRB) Volume 11, Section 2, Part 4[136], and DMRB Volume 11, Section 3, Part 10[137].

13.1.2 For the purposes of this assessment, the water environment is assumed to comprise:

- Surface waters (ponds, lakes, watercourses)
- Groundwater, including Source Protection Zones (SPZ)
- Nitrate Vulnerable Zones (NVZ)
- Abstractions and discharges
- Flood risk

13.1.3 The construction and operation of highways can have a range of effects on the water environment, as follows:

- 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 can occur as a result of construction site run-off associated with contaminated land, spillages during construction, routine run-off during operation, or spillages during operation (usually following road accidents).
- Increased flood risk as a result of increased areas of impermeable ground surfaces, loss of flood plain land, or changes in road drainage.

13.1.4 The results of the assessment contained in this chapter were reported within the Environmental Impact Assessment Scoping Report submitted to the Planning Inspectorate in November 2017. Following receipt of the Scoping Opinion from PINS on 9 January 2018 (further information contained within section 4.1), it has been recommended as part of this Scoping Opinion that the road drainage and water environment assessment is scoped in to the Environmental Statement (ES). The information contained within the Scoping Opinion will be reviewed in detail and consultation will continue with the relevant consultation bodies to confirm the scope of the road drainage and water environment assessment to be included as part of the ES.

[136] Highways England (2008) DMRB Volume 11 Section 2 Part 4 HA 204/08 Scoping of Environmental Impact Assessments.
[137] Highways England (2008) DMRB Volume 11 Section 3 Part 10 HD 45/09 Road Drainage and the Water Environment.

13.2 Legislation and policy context

Water Framework Directive (2000/60/EC)

13.2.1 The key EU legislation covering the water environment which has a bearing on this scheme is the Water Framework Directive (WFD) (2000/60/EC), which establishes a framework for the management of water resources throughout the European Union. The WFD are translated into UK law through the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. The key objectives of the WFD, provided for in the area River Basin Management Plan (RBMP), are to:

- Prevent deterioration, enhance and restore bodies of surface water, achieve good chemical and ecological status of such water and reduce pollution from discharges and emissions of hazardous substances
- Protect, enhance and restore all bodies of groundwater, achieve good chemical and quantitative status of groundwater, prevent the pollution and deterioration of groundwater, and ensure a balance between groundwater abstraction and replenishment
- Preserve protected areas

The Environmental Permitting Regulations (2010)

13.2.2 The Environmental Permitting Regulations (EPR) 2010 aim to protect groundwater and surface waters from pollution by controlling the inputs of potentially harmful and polluting substances. The Regulations implement the WFD and the Groundwater Daughter Directive 2006. The EPR replace those parts of the Water Resources Act (WRA) 1991 that relate to the regulation of discharges to controlled waters (including groundwater).

The Highways Act 1980

13.2.3 Under the Highways Act 1980 (Section 100), the Highways Agency has a right to discharge runoff from highways into inland and tidal waters, or groundwaters (i.e. controlled waters as defined under the Water Resources Act 1991), but is subject to the requirement not to pollute controlled waters.

The Water Resources Act (1991)

13.2.4 Section 93 of the WRA provides for the establishment of groundwater protection zones. The requirements of Section 93 are implemented and set out in the Environment Agency's Groundwater protection guides[138] covering: requirements, permissions, risk assessments and controls (previously covered in GP3). Source Protection Zones (SPZs) are defined for groundwater supplies used for human consumption. The Environment Agency's position statement relating to the use of sustainable drainage systems within these guides.

[138] Department for Environment Food and Rural Affairs (2017) Groundwater protection [online] available at: https://www.gov.uk/government/collections/groundwater-protection (last accessed January 2018).

The Land Drainage Act (1991)

13.2.5 The Land Drainage Act 1991 is also relevant to manage flood risk for any works within 8 metres of ordinary watercourses.

The National Policy Statement for National Networks

13.2.6 The National Policy Statement for National Networks (NPSNN)[139] 2014 has been considered within this assessment. This policy confirms that applications for schemes in Flood Zones 2 and 3 should be accompanied by a Flood Risk Assessment (FRA). In addition, applications for schemes that are located within Flood Zone 1 and are 1ha 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 (LPA) that there are critical drainage problems, should also be accompanied by an FRA. For projects which may be affected by, or may add to flood risk, sufficiently early pre-application discussions should be sought between the applicant and the Environment Agency, and, where relevant, other flood risk management bodies (Paragraph 5.96 of the NPSNN). Surface water flood issues also should be understood and then taken account of (Paragraph 5.97 of the NPSNN)).

13.3 Assessment methodology

13.3.1 Assessment methodology for defining the significance of effects upon road drainage and the water environment is contained within Section 14.12 of the Environmental Impact Assessment Scoping Report submitted to the Planning Inspectorate in November 2017. The Scoping Report can be accessed here:

13.3.2 https://infrastructure.planninginspectorate.gov.uk/projects/south-west/a303-sparkford-to-ilchester/?ipcsection=docs.

13.4 Study area

13.4.1 The study area encompasses surface water features and human health receptors (taken to be drinking water abstractions in the context of this chapter) within a 1 kilometre area around the scheme. This is extended where there are features that may be affected by pollutants transported downstream of the works, and therefore these features are included in the assessment as appropriate. Additionally, for groundwater, the potential zone of impact during construction and operation phases is assessed on the underlying WFD groundwater body.

13.4.2 The study area is based on professional judgement to ensure that effects are sufficiently identified and is extended where there are features downstream of the scheme that may be affected.

[139] Department for Transport (2014), National Networks National Policy Statement. Available online at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/387223/NNNPS-web.pdf

13.5 Existing baseline

13.5.1 Information to assist with the existing baseline has been collected from the following sources:

- RBMP South West River Basin District[140];
- Environment Agency's Catchment Data Explorer[141];
- Environment Agency's website: "What's In Your Backyard?"[142];
- Environment Agency's website: Flood Map for Planning[143]; and
- DEFRA's 'Magic' interactive map[144].

Surface water

13.5.2 The land alongside the scheme is mainly used for arable cropping, interspersed with residential properties and farms. There is a network of drainage ditches and field drains, some of which are spring fed and some are partially culverted where they flow under the existing A303. This network forms tributaries of the Cam - Lower waterbody to the south of the scheme, Park Brook to the west of the scheme and Dyke Brook to the north of the scheme.

13.5.3 The Cam - Lower WFD waterbody (GB108052015650) is located approximately 680 metres to the south of the scheme. It is not classified as an artificial or heavily modified water body (HMWB) and is currently rated as Moderate status in the 2015 South West RBMP with objective of achieving Good status by 2027.

13.5.4 The Yeo Ds Over Compton WFD waterbody (GB108052015682) is the downstream waterbody of Cam - Lower and is located approximately 4.4 kilometres downstream to the south-west of the scheme. It is classified as a HMWB and is currently rated as Moderate potential in the 2015 South West RBMP with objective of achieving Good potential by 2027. It supports the Wet Moor Sites SSSI and the Somerset Levels & Moors SPA and Ramsar site.

13.5.5 To the south-west and to the north of the scheme, the drainage ditches outfall into Park Brook (1.2 kilometres downstream) and Dyke Brook (1.6 kilometres downstream). These are not classified as WFD waterbodies but are tributaries of the Cary - source to conf with KSD WFD waterbody (GB108052015140, which is located to the west of the scheme, approximately 4.5 kilometres downstream from the eastern section of the scheme via Dyke Brook and approximately 2.9 kilometres downstream from the west end of the scheme via Park Brook. The Cary - source to conf with KSD WFD waterbody is not

[140] Environment Agency (2015) RBMP, South West River Basin District [online Available https://www.gov.uk/government/collections/river-basin-management-plans-2015 (last accessed November 2017).
[141] Environment Agency (2018) Catchment Data Explorer: Cam – Lower [online] available at http://environment.data.gov.uk/catchment-planning/WaterBody/GB108052015650 (last accessed November 2017).
[142] Environment Agency. What's In Your Backyard? Available at http://apps.environment-agency.gov.uk/wiyby/default.aspx, accessed 24/04/2017.
[143] Environment Agency (2017). Flood Map for Planning. Available at https://flood-map-for-planning.service.gov.uk/, accessed 05/05/2017.
[144] Magic Interactive Mapping. Available at http://www.magic.defra.gov.uk, accessed 24/04/2017.

designated as an artificial or HMWB and is currently rated as Moderate status in the 2015 South West RBMP with objective of achieving Good status by 2027.

13.5.6 The Cary - source to conf with KSD WFD waterbody is designated as an aquatic Local Wildlife Site (LWS) and supports the King's Sedgemoor SSSI, the Somerset Levels & Moors SPA and Ramsar and the Somerset Levels National Nature Reserves (NNR).

Groundwater

13.5.7 There is no underlying WFD groundwater body within the study area. However, the groundwater is mainly classified as Secondary A both for superficial and bedrock deposits.

13.5.8 The scheme lies over an area of bedrock classed as a Secondary A aquifer with a small area classed as Secondary B around Queen Camel[145]. To the north and to the south of the A303 there are superficial groundwater layers classed as a Secondary A aquifer. The groundwater vulnerability is predominantly Minor Aquifer Intermediate with areas of Minor Aquifer High around the surface waterbodies.

13.5.9 Due to the geology of the area, which is mainly loamy and clay soils, the natural drainage system drains to surface watercourses with impeded drainage to the groundwater[146]. However, this is not valid for the areas along Dyke Brook and Park Brook where, despite the loamy and clay soil, the area is naturally wet with a high-water table and the natural drainage system drains to the local groundwater feeding into surface watercourses.

13.5.10 There are no SPZs within the study area, the closest is an SPZ2 4.4 kilometres to the south-east of the eastern end of the scheme.

Flood zones

13.5.11 There are areas to the north and south of the scheme classified as Flood Zones 3 and 2, mainly associated with the Dyke Brook and River Cam. These zones are defined as follows:

- Flood Zone 3 is land assessed as having a 1-in-100 or greater annual probability of river flooding (>1%)
- Flood Zone 2 is land having a 1-in-1000 or greater annual probability of river flooding (0.1%)

[145] Environment Agency (2018) What's In Your Backyard? [online] available at: http://maps.environment-agency.gov.uk/wiyby/wiybyController?x=360500.0&y=126500.0&topic=groundwater&ep=map&scale=9&location=Sparkford, Somerset&lang=_e&layerGroups=default&distance=&textonly=off#x=357685&y=125967&lg=4,10,&scale=7 (last accessed November 2017).
[146] Cranfield University (2017) Soilscapes Map [online] available at: http://www.landis.org.uk/soilscapes/ (last accessed Novemebr 2017).

13.5.12 Flood defences are located to the south of the scheme in Queen Camel, West Camel and Bridgehampton. However, there are no areas benefitting from flood defences.

Protected zones and sites

13.5.13 The surface water to the north of the existing A303 is within an NVZ. This is likely to be due to the nitrates contained in runoff from agricultural land that is causing, or could cause, pollution of the water environment.

13.5.14 The scheme is located within the SSSI Impact Risk Zone (IRZs) of Sparkford Wood, Babcary Meadows, East Polden Grassland and Wet Moor SSSIs. IRZs have been developed by Natural England to define zones around each SSSI which reflect the particular sensitivities of the features for which it is notified, and indicate the types of development proposal which could potentially have adverse impacts.

13.5.15 Sparkford Wood SSSI, is located 1.4 kilometres north-east of the scheme and is designated for broadleaved, mixed and yew woodland. Babcary Meadows SSSI, is located 3.9 kilometres to the north of the scheme and is designated for neutral grassland. East Polden Grassland SSSI, is located 4.2 kilometres north-west of the scheme and is designated for calcareous grassland. However, these sites are not hydraulically linked to the scheme, and they are therefore scoped out of this assessment.

13.5.16 The Wet Moor SSSI is located 15.5 kilometres to the west of the scheme, via the Cam – Lower waterbody and is designated for birds, invertebrates, neutral grassland, rivers and streams, standing open water and canals. The Wet Moor SSSI forms part of the Somerset Levels & Moors SPA and Ramsar site.

13.5.17 The King's Sedgemoor SSSI is located to the west of the scheme, 17.9 kilometres via Park Brook and 20 kilometres via Dyke Brook. It is designated for birds, invertebrates, otters, neutral grassland, standing open water and canals. The King's Sedgemoor SSSI include the Somerset Levels NNR and forms part of the Somerset Levels & Moors SPA and Ramsar site.

13.5.18 Several LWS are located in the study area and are reported in Table 13.1. However, the LWS that are not water dependent or hydraulically linked with the scheme will not be considered further within this assessment.

Table 13.1: Existing LWS within the study area (from east to west)

LWS	Distance and direction from scheme	Features	To be considered within the assessment
Hazlegrove Park	Crossed by the scheme	Important assemblage of veteran trees and specialist invertebrate fauna	No
Sparkford Hill Copse	400m, south-east	Ancient woodland	No
Ridge Copse	50m, south	Semi-natural broadleaved woodland and quarry workings	No
Gason Lane Field	25m, south	Semi-improved calcareous grassland, with a narrow strip of broadleaved woodland	No
Camel Hill Transmitter Site	Adjacent, south	Unimproved calcareous grassland and semi-natural broadleaved woodland	No
Yarcombe Wood	840m, north	Ancient semi-natural broadleaved woodland and pond	Yes
Vale Farm Field	470m, north	Remnants of calcareous grassland	No
Parson's Steeple	230m, north	Ancient woodland site with semi-natural broadleaved woodland and mixed plantation stands	No
Lindsay House Quarry*	290m, north	Small quarry with herb rich calcareous grassland, scrub and broadleaved woodland	No
Annis Hill*	330m, north	Ancient semi-natural broadleaved woodland	No
Bower Plantation*	750m, north	Semi-natural broadleaved woodland	No
Cogberry Plantation	590m, north	Ancient semi-natural broadleaved woodland	No
River Cary	1.5km, north-west	Aquatic habitat with rare flora, bird and invertebrate interest including legally protected species	Yes
Downhead Manor Farm (candidate LWS[147])	Adjacent, north	Ancient semi-natural & semi-natural broadleaved woodland. Small quarry with herb rich calcareous grassland and broadleaved woodland and Secondary broadleaved woodland.	No – not hydraulically linked

* Included in Downhead Manor Farm Candidate LWS

Licenced abstractions

13.5.19 There are no surface water or groundwater abstractions in the study area. The closest surface water abstraction is approximately 2.9 kilometres south-west of the scheme, in Ilchester; while the closest groundwater abstraction is approximately 3.5 kilometres north-west of the scheme, in Charlton Adam[148]. As these lie outside of the study area, they will not be considered further within this assessment.

Consented discharges

13.5.20 The active consented discharges within 1 kilometres of the scheme[149] are reported in Table 13.2.

[147] Somerset Environmental Record Centre (2017). Evaluated Site Details – Around site at ST 5798 2543.
[148] Environment Agency. What's In Your Backyard? Available at: http://maps.environment-agency.gov.uk/wiyby/wiybyController?x=360500.0&y=126500.0&topic=water_abstractions&ep=map&scale=9&location=Sparkford, Somerset&lang=_e&layerGroups=default&distance=&textonly=off#x=357226&y=125882&lg=2,1,&scale=7 accessed 26/04/2017
[149] Environment Agency. Environmental Permitting Regulations [online] available at: https://environment.data.gov.uk/public-register/view/search-water-discharge-consents (last accessed March 2017)

Table 13.2: Existing water consented discharges within 1km of the scheme

Owner	Location	Grid reference	Approximate distance and direction from the scheme	Nature of discharge
Chartman Limited	Wakes Garage, A359/A303, Sparkford, Somerset, BA22 7JE	ST6000025820	225m, south-east	Shop including garden centre/retail trade (not motor vehicle)
Mr M Penn	Haynes Motor Museum, Sparkford, Yeovil, Somerset	ST6090026900	860m, north-east	Single domestic property including farm house
Kelda Water Services (Estates) Limited	Dwelling, Eyewell House, Camel Hill, Queen Camel, Yeovil, Somerset	ST5875025300	35m, south	Multiple domestic property including farm houses
Wessex Water Services Ltd	Green Lane Pumping Station, Green Lane, Queen Camel, Somerset, BA22 7NP	ST5929424948	645m, south	Storm tank/combined sewer overflows on sewerage network (water company)
G P Spiller	Wales Farm, Queen Camel, Yeovil, Somerset, BA22 7PA	ST5849024640	780m, south	Farms (not house)/crop and animal rearing/plant nursery
Mr W J Down & Partners	Slocourt Farm, Urgashay, Yeovil, Somerset	ST5709024470	575m, south	Farms (not house)/crop and animal rearing/plant nursery
Wessex Water Services Limited	Frog Lane Pumping Station, West Camel, Somerset	ST5753024630	540m, south	Pumping station on sewerage network (water company)
D L & H L Board	Church Farm, Podimore, Yeovil, Somerset	ST5456024780	465m, south-west	Farms (not house)/crop and animal rearing/plant nursery
Wessex Water Services Ltd	Podimore Sewage Treatment Works	ST5443024700	630m, south west	Waste water/sewage treatment works (water company)

Contaminated land

13.5.21 No authorised landfills are present within the study area.

13.5.22 Three historic landfills are located to the east area of the scheme, as follows:

- Land Adjacent to Hazlegrove Park is adjacent to the existing A303 to the north-west of Sparkford and would be crossed by the scheme
- Camel Hill Quarry is approximately 160 metres to the south of the new Hazlegrove roundabout area
- Sparkford Refuse Tip that is approximately 770 metres to the south-east of the new Hazlegrove roundabout area

13.5.23 These areas might be subject to contamination; reference should be made to chapter 9 Geology and Soils for detailed information. The works would not affect Camel Hill Quarry and Sparkford Refuse Tip. In addition, these 2 historic landfills are not hydraulically linked to the scheme and will therefore not be considered further within this assessment.

13.6 Value (sensitivity of receptors)

13.6.1 The following receptors contained in Table 13.3 have been identified that could potentially be affected as a result of the scheme.

Table 13.3: Receptor sensitivities

Receptor	Receptor sensitivity	Reasoning
Drainage ditches	Low	Not designated under the WFD, some flow through non-aquatic LWS and downstream WFD waterbodies.
Ponds	Low	Not designated under the WFD and some are located within non-aquatic LWS.
Cam- Lower waterbody	Medium	WFD status of Moderate and a target of Good by 2027 and it also lies upstream of the Wet Moor SSSI and Somerset Level & Moors SPA and Ramsar Site.
The Yeo Ds Over Compton waterbody	Very High	Part of it is a European designated conservation site (Wet Moor SSSI and Somerset Level & Moors SPA and Ramsar Site).
The Dyke Brook The Park Brook	Medium	Although not designated under the WFD these are both tributaries of the Cary - source to conf with KSD waterbody, which have a target status of Good by 2027. It also supports the River Cary aquatic LWS.
The Cary	High	Source to conf with KSD. current WFD status of Moderate and a target of achieving Good status by 2027. In addition, it is designated as aquatic LWS and support the downstream King's Sedgemoor SSSI, Somerset Level and Moors SPA and Ramsar Site and Somerset Levels NNR.
The Groundwater (superficial deposit)	Medium	Although it is not designated under the WFD it is a Secondary A aquifer with groundwater vulnerability classified as Minor Aquifer Intermediate with areas of Minor Aquifer High. The groundwater is potentially in use as agricultural water supply (farming and domestic, aquaculture).
The Groundwater (bedrock deposit)	Medium	Although it is not designated under the WFD it is a Secondary A aquifer with areas of Secondary B aquifer. Its vulnerability is classified as Minor Aquifer Intermediate with areas of Minor Aquifer High. The groundwater is potentially in use as agricultural water supply (farming and domestic, aquaculture).
Flood Risk	Very High	The scheme lies in a floodplain with more than 100 residential properties. There are areas of Flood Zones 3 and 2 alongside Dyke Brook and Cary - Source to conf with KSD (approx. 1km to the north of the scheme) and Cam - Lower (500m to the south of the scheme). There are no areas benefitting from the presence of flood defences.

13.7 Consultation

13.7.1 A meeting was held with the Environment Agency on the 4 July 2017 to discuss the proposed scheme options in relation to aquatic ecology, flood risk and the WFD. Discussion was held relating to the assessment methodology, mitigation proposals and to confirm the Environment Agency's requirements.

13.7.2 A further meeting was held on the 7 December 2017, at which the scope of the ongoing assessment was discussed. Following the receipt of the Scoping Opinion received from the Planning Inspectorate in January 2018, further discussions regarding the scope of the assessment will be undertaken with the relevant environmental consultees, prior to the production of the ES.

13.8 Assumptions and limitations

13.8.1 A full quantitative assessment using the Step 1 and 2 Highways Agency Water Risk Assessment Tool (HAWRAT) model was not possible given the limited drainage information available at this stage of the scheme design. This assessment therefore represents a qualitative assessment based on professional judgement at this stage. It is recognised that a full HAWRAT assessment will need to be undertaken as part of the scheme's drainage design.

13.8.2 It is assumed that the design would ensure treatment/containment facilities are fully incorporated to control any risk to the water environment, and all mitigation measures in accordance with standard guidance will be adhered to.

13.9 Design, mitigation and enhancement measures

13.9.1 Without mitigation measures in place, there is the potential for mobilisation of sediment and contaminants from road runoff to the watercourses during construction. In addition, with attenuation of run-off, there is the potential for increased flood risk.

Construction

13.9.2 During construction, best practice measures for pollution prevention and water management would be implemented as part of a Construction Environmental Management Plan (CEMP), which would be produced for the scheme. Guidance on best practice in relation to pollution prevention and water management is set out in CIRIA's 'Environmental good practice on site'[150] and the Environment Agency's 'Protect groundwater and prevent groundwater pollution'[151].

13.9.3 To mitigate potential adverse effects upon surface waters and groundwater during the construction phase, the following measures would be implemented:

- All construction workers would be briefed on the importance of maintaining water quality, the location of surface water features, and the location and use of spill kits as part of the site induction
- The construction drainage network would incorporate measures (e.g. interceptors) to prevent the discharge of hydrocarbons to surface or ground water systems
- In areas where there is increased risk of hydrocarbon/chemical spillage and around hazardous substance stores, additional precautions would be taken. These will include bunding, impermeable bases, suitable drainage systems, and siting away from any open drainage channels
- Any stockpiled materials would be stored within enclosed areas to enable the runoff to be stored and treated where required

[150] Audus, Charles and Evans (2010) Environmental Good Practice on Site (Third Edition) (C692).
[151] Environment Agency (2017) Protect groundwater and prevent groundwater pollution [online] available at: https://www.gov.uk/government/publications/protect-groundwater-and-prevent-groundwater-pollution/protect-groundwater-and-prevent-groundwater-pollution (last accessed March 2017)

- Any concrete works would be carefully controlled and where required, any concrete tankers would be washed out in controlled areas
- All plant and machinery would be maintained in a good condition and any maintenance required would be undertaken within safe areas
- Pollution Prevention and Spill Response Procedures would be developed by the Contractor and a spill kit and clean up equipment maintained on site
- Wheel washers and dust suppression measures would be used to prevent the migration of pollutants
- Monitoring of the surface watercourses would be carried out before, during, and after construction to ensure no adverse impact on water quality

Operation

13.9.4 Where the assessment of the risks of pollution from road runoff shows the need for mitigation, there are several options available. The use of conventional drainage systems to reduce pollution is described in HD33 (DMRB 4.2). Vegetated drainage systems are described in HA103 (DMRB 4.2) and guidance on design of soakaways is given in HA118 (DMRB 4.2). Advice on Grassed Surface Water Channels for Highway Runoff is given in 119 (DMRB 4.2).

13.9.5 Vegetated systems can reduce the pollution risk and enhance aspects of the water environment and landscape, as well as benefiting biodiversity, and in such cases should be designed with the assistance of the appropriate specialist for landscape/biodiversity. However, it should be recognised that the primary function of the drainage system would be the attenuation and treatment of highway runoff. Drainage systems may be either active or passive in operation:

- Active systems (requiring operators)
  - Penstocks
  - Valves
  - Notched weirs
- Passive systems
  - Swales
  - Ponds and wetlands
  - Ditches
  - Basins and silt traps
  - Filter drains and soakaways
  - Oil separators

13.9.6 While there is no drainage strategy available at this stage of the scheme, in accordance with the requirements of the NPSNN and NPPF, surface water runoff would be attenuated to ensure there is no increase in surface water run-off rates from the scheme. Opportunities to provide a fully SuDS based drainage system will be explored and implemented where feasible.

13.10 Assessment of effects

Construction

13.10.1 Construction activities could mobilise sediments and contaminants through surface water runoff to the drainage ditches adjacent to the scheme. In the absence of adequate mitigation this could result in water quality deterioration. Chemical spillages/leaks during construction, for example fuel or oils, could have a similar result.

13.10.2 The CEMP would include mitigation measures specifically for runoff and spillages as described in section 13.9. Therefore, the impact of contaminated runoff and spillages would be Negligible for the drainage ditches and ponds, Cam - Lower, Yeo Ds Over Compton, Dyke Brook, Park Brook, Cary - Source to conf with KSD, Secondary A aquifer – groundwater superficial deposit and Secondary A aquifer – groundwater bedrock deposit. Consequently, the effect on all waterbodies would be Neutral.

13.10.3 Contaminated land disturbance is of concern due to the vicinity of the Land Adjacent to Hazlegrove Park historic landfill site. The drainage ditches, ponds, Dyke Brook, Cary - Source to conf with KSD, the Secondary A aquifer – groundwater superficial deposit and Secondary A aquifer – groundwater bedrock deposit are considered to be receptors for this potential impact. To prevent pollution from contaminated land, GI would be carried out prior to construction, with remediation or capping of known contaminated areas carried out where appropriate. Therefore, there would be a Negligible impact on the drainage ditches and ponds, the Dyke Brook, Cary - Source to conf with KSD and on the groundwater superficial and bedrock deposit.

13.10.4 Temporary and localised dewatering of areas of shallow groundwater due to high water table may be required where excavation works are necessary for the road construction (e.g. insertion of deep piling). This is considered to be a Negligible impact, and therefore, a Neutral effect as dewatering would be minimised where practicable through design. There is also the potential for effects on the waterbody to which the dewatering effluent would be discharged (assumed to be the drainage ditches). However, measures would be laid out within the CEMP to ensure settlement of suspended sediments within the discharged effluent and this would therefore be a Negligible impact, and a Neutral effect.

13.10.5 Changes to groundwater level or flow due to the presence of below ground structure are considered to be a Negligible impact, and therefore, a Neutral effect due to the mitigation measurement within the CEMP and consideration during the detailed design stage.

13.10.6 Mitigation within the CEMP, specific consideration of biological and hydromorphological conditions of the receiving watercourse during the detailed design stage and the timing of the works would reduce the physical impact due to the construction of new outfalls and the upgrade of existing outfalls. This is considered to be a Minor Adverse impact on drainage ditches and therefore would be a Neutral effect.

13.10.7 The construction assessment is summarised in Table 13.8.

Operation

13.10.8 Contaminants within surface water runoff due to traffic typically include vehicle emissions (including atmospheric deposition), vehicle part wear and vehicle leakages, catalytic converters, road surface erosion, and seasonal and regular maintenance practices. Possible contaminants include particulate solids, hydrocarbons (diesel, petroleum, lubricating oil leakages, and grease), heavy metals (especially copper and zinc but also cadmium, iron, lead and chromium in lesser amounts), oxides of nitrogen, sulphates, rubber, asbestos, tyre wear deposits including lead, zinc, and hydrocarbons, and de-icer during cold weather. All these can have adverse effects on receiving watercourses.

13.10.9 The details of the proposed drainage design are not known at the time of writing, but it is assumed for the purposes of this assessment that SuDS and pollution control measures would be incorporated within the design, which would reduce the levels of pollutants and provide protection to the surrounding watercourses from routine runoff and in the event of a major spillage or accident. The impact of surface water runoff would therefore be Negligible for drainage ditches, Cam - Lower, Yeo Ds Over Compton, Dyke Brook, Park Brook, Cary - Source to conf with KSD. Consequently, the effect would be Neutral for all the surface waterbodies.

13.10.10 Drainage ditches would be infilled to construct the road embankment. This would have a Moderate Adverse impact and therefore a Slight Adverse effect.

13.10.11 The design of the new outfall and the upgrade of those already present on the A303 would be carried out in accordance with Environment Agency guidance. This is considered to be a Negligible impact on drainage ditches, Dyke Brook, and Cary – Source to conf with KDS and therefore would be a Neutral effect for all of these surface waterbodies.

13.10.12 Piling may be required in some areas due to local geology (refer to chapter 9 Geology and Soils). However, piling would be minimised where practicable during the detailed design stage. Therefore, the physical impact and the creation of preferential pathway due to this activity are considered to be a Negligible impact on the Secondary A aquifer – groundwater superficial deposit and Secondary A aquifer – groundwater bedrock deposit; this would be a Neutral effect for both groundwater bodies.

13.10.13 The additional impermeable area resulting from the new road would generate additional surface water runoff, which if not attenuated, could increase flood risk to the surrounding area. At the time of writing, the details of the proposed drainage design are not known, however, the design of the drainage for the scheme would ensure no increase in run-off rates, in accordance with the NNPF and the NPSNN. This would, therefore, be a Negligible impact, and a Neutral effect.

13.10.14 The operational assessment is summarised in Table 13.8.

Table 13.8: Summary of impact assessment for construction and operation

Receptor	Value	Potential impact	Mitigation	Magnitude of impact	Significance of effect
Construction					
Drainage ditches	Low	Pollution from suspended sediment/contaminated runoff.	Compliance with CIRIA Guidance. Construction related runoff would be controlled by measures listed in the CEMP.	Negligible	Neutral
		Pollution from chemical spillages/leaks and water runoff.	Compliance with CIRIA Guidance. Construction related runoff would be controlled by measures listed in the CEMP.	Negligible	Neutral
		Disturbance of contaminated ground causing pollution.	GI prior to construction and remediation or capping of known contaminated areas.	Negligible	Neutral
		Discharge of dewatering.	Discharges would be in accordance with the CEMP.	Negligible	Neutral
		Physical impact from new/upgraded outfall.	Consideration of biological and hydromorphological condition of the drainage ditches during the detailed design stage. Selection of best timing for the works.	Minor Adverse	Neutral
Ponds	Low	Pollution from suspended sediment/contaminated runoff.	Compliance with CIRIA Guidance. Construction related runoff would be controlled by measures listed in the CEMP.	Negligible	Neutral
		Pollution from chemical spillages/leaks and water runoff.	Compliance with CIRIA Guidance. Construction related runoff would be controlled by measures listed in the CEMP.	Negligible	Neutral
		Disturbance of contaminated ground causing pollution.	GI prior to construction and remediation or capping of known contaminated areas.	Negligible	Neutral
Cam - Lower (GB108052015650)	Medium	Pollution from suspended sediment/contaminated runoff.	Compliance with CIRIA Guidance. Construction related runoff would be controlled by measures listed in the CEMP.	Negligible	Neutral
		Pollution from chemical spillages/leaks and water runoff.	Compliance with CIRIA Guidance. Construction related runoff would be controlled by measures listed in the CEMP.	Negligible	Neutral
Yeo Ds Over Compton (GB108052015682)	High	Pollution from suspended sediment/contaminated runoff.	Compliance with CIRIA Guidance. Construction related runoff would be controlled by measures listed in the CEMP.	Negligible	Neutral
		Pollution from chemical spillages/leaks and water runoff.	Compliance with CIRIA Guidance. Construction related runoff would be controlled by measures listed in the CEMP.	Negligible	Neutral
Dyke Brook	Medium	Pollution from suspended sediment/contaminated runoff.	Compliance with CIRIA Guidance. Construction related runoff would be controlled by measures listed in the CEMP.	Negligible	Neutral
		Pollution from chemical spillages/leaks and water runoff.	Compliance with CIRIA Guidance. Construction related runoff would be controlled by measures listed in the CEMP.	Negligible	Neutral
		Disturbance of contaminated ground causing pollution.	GI prior to construction and remediation or capping of known contaminated areas.	Negligible	Neutral
Park Brook	Medium	Pollution from suspended sediment/contaminated runoff.	Compliance with CIRIA Guidance. Construction related runoff would be controlled by measures listed in the CEMP.	Negligible	Neutral
		Pollution from chemical spillages/leaks and water runoff.	Compliance with CIRIA Guidance. Construction related runoff would be controlled by measures listed in the CEMP.	Negligible	Neutral
Cary - source to conf with KSD waterbody (GB108052015140)	High	Pollution from suspended sediment/contaminated runoff.	Compliance with CIRIA Guidance. Construction related runoff would be controlled by measures listed in the CEMP.	Negligible	Neutral
		Pollution from chemical spillages/leaks and water runoff.	Compliance with CIRIA Guidance. Construction related runoff would be controlled by measures listed in the CEMP.	Negligible	Neutral
Groundwater - superficial deposit	Medium	Pollution from suspended sediment/contaminated runoff.	Compliance with CIRIA Guidance. Construction related runoff would be controlled by measures listed in the CEMP.	Negligible	Neutral
		Pollution from chemical spillages/leaks and water runoff.	Compliance with CIRIA Guidance. Construction related runoff would be controlled by measures listed in the CEMP.	Negligible	Neutral
		Disturbance of contaminated ground causing pollution.	GI prior to construction and remediation or capping of known contaminated areas.	Negligible	Neutral
		Dewatering affecting groundwater level	Dewatering minimised where practicable, through design reducing the requirement for deep excavations	Negligible	Neutral

Receptor	Value	Potential impact	Mitigation	Magnitude of impact	Significance of effect
		Changes to groundwater level/flow	Below ground structure minimised where practicable during detailed design stage. Selection of best timing for temporary below ground structure utilisation in relation to the seasonal variation of groundwater level.	Negligible	Neutral
Groundwater - bedrock deposit	Medium	Pollution from suspended sediment/contaminated runoff.	Compliance with CIRIA Guidance. Construction related runoff would be controlled by measures listed in the CEMP.	Negligible	Neutral
		Pollution from chemical spillages/leaks and water runoff.	Compliance with CIRIA Guidance. Construction related runoff would be controlled by measures listed in the CEMP.	Negligible	Neutral
		Disturbance of contaminated ground causing pollution.	GI prior to construction and remediation or capping of known contaminated areas.	Negligible	Neutral
		Dewatering affecting groundwater level	Dewatering minimised where practicable, through design reducing the requirement for deep excavations	Negligible	Neutral
		Changes to groundwater level/flow	Below ground structures minimised where practicable during detailed design stage. Selection of best timing for temporary below ground structure utilisation in relation to the seasonal variation of groundwater level.	Negligible	Neutral
Operation					
Drainage ditches	Low	Contaminants within surface water runoff due to traffic	SuDS and pollution control measures would be incorporated within the drainage design.	Negligible	Neutral
		Physical impact from new/upgraded outfall	Design will be in accordance with Environment Agency guidance.	Negligible	Neutral
		Physical impact from waterbody infilled due to presence of embankment	Loss due to infilling minimised where practicable during detailed design. Creation of new drainage ditches/ponds.	Moderate Adverse	Slight Adverse
Cam - Lower (GB108052015650)	Medium	Contaminants within surface water runoff due to traffic	SuDS and pollution control measures would be incorporated within the drainage design.	Negligible	Neutral
Yeo Ds Over Compton (GB108052015682)	High	Contaminants within surface water runoff due to traffic	SuDS and pollution control measures would be incorporated within the drainage design.	Negligible	Neutral
Dyke Brook	Medium	Contaminants within surface water runoff due to traffic	SuDS and pollution control measures would be incorporated within the drainage design.	Negligible	Neutral
		Physical impact from new/upgraded outfall	Design will be in accordance with Environment Agency guidance.	Negligible	Neutral
Park Brook	Medium	Contaminants within surface water runoff due to traffic	SuDS and pollution control measures would be incorporated within the drainage design.	Negligible	Neutral
Cary - source to conf with KSD waterbody (GB108052015140)	High	Contaminants within surface water runoff due to traffic	SuDS and pollution control measures would be incorporated within the drainage design.	Negligible	Neutral
		Physical impact from new/upgraded outfall	Design will be in accordance with Environment Agency guidance.	Negligible	Neutral
Groundwater - superficial deposit	Medium	Changes to groundwater level/flow	Consideration of groundwater level/flow during detailed design stage.	Negligible	Neutral
		Physical impact/creation of preferential pathway from piling	Piling minimised where practicable during detailed design stage.	Negligible	Neutral
Groundwater - bedrock deposit	Medium	Changes to groundwater level/flow	Consideration of ground level/flow during detailed design stage.	Negligible	Neutral
		Physical impact/creation of preferential pathway from piling	Piling minimised where practicable during detailed design stage.	Negligible	Neutral
Floodplain	Very High	Increased surface water runoff from the scheme.	Drainage design to ensure no increase in runoff rates in accordance with the NNPF and NPSNN.	Negligible	Neutral

13.11 Monitoring requirements for significant adverse effects

13.11.1 At the time of writing, no significant adverse effects are anticipated on the water environment. However, water quality monitoring may be carried out during construction as a requirement of the CEMP. Further information will be included within the ES.

13.12 Conclusions

13.12.1 This assessment has been carried out at a qualitative level in terms of receptor value, predicted impact magnitude and significance of effect. To attenuate surface water run-off, prevent pollution within surface water discharge, prevent physical effects from new structures (i.e. piling, outfalls, embankments) and to ensure no increase in flood risk, standard mitigation measures would be included in the CEMP, and SuDS would be implemented. Therefore, no significant effects are anticipated on the water environment, during both construction and operation.

13.12.2 Mitigation measures will be contained within the CEMP for Land Adjacent to Hazlegrove Park, the historic landfill site adjacent to the north-east of the scheme, to avoid mobilisation of contaminated soil or contaminated runoff in the nearby drainage ditches. The overall on balance significance of effects on the water environment would be Neutral during both construction and operation.

13.12.3 As highlighted in paragraph 13.1.4, the information contained within the Scoping Opinion will be reviewed in detail and consultation will continue with the relevant consultation bodies to confirm the scope of the assessment to be included as part of the ES.

13.12.4 A Water Framework Directive (WFD) screening assessment and a Flood Risk Assessment (FRA) will be appended to the ES as part of the Development Consent Order (DCO) application.

14 Climate

14.1 Introduction

14.1.1 This chapter presents the on-going work for the assessment of the potential effects of the scheme on climate change related environmental factors. To align with the requirements of the Infrastructure Planning (Environmental Impact Assessment) (EIA) Regulations 2017 and the National Policy Statement for National Networks[152] (NPSNN) it has been divided into 2 separate aspects:

- Greenhouse gas (GHG) impact assessment – effects on climate change of GHG emissions arising from the proposed scheme, including how the project will affect the ability of Government to meet its carbon reduction plan targets (in accordance with Paragraph 5.17 of the NPSNN);
- Climate change resilience assessment – the resilience of the proposed scheme to climate change impacts, including how the proposal will take account of the projected impacts of climate change (in accordance with Paragraph 4.40 of the NPSNN and the Infrastructure Planning (EIA) Regulations 2017

14.1.2 It is now established that as a result of rising concentrations of carbon, Carbon Dioxide (CO_2), and other greenhouse gases in the atmosphere, a degree of climate change is inevitable and is expected to have significant implications for infrastructure assets in the future, particularly those with long operational lifetimes. This makes them sensitive not only to the existing climate at the time of their construction, but also to climate variations over the decades of their use. In addition, the Climate Change Act was passed in November 2008, which sets ambitious, legally binding targets of reducing CO_2 emissions by 34% by 2020 and 80% by 2050, relative to the 1990 baseline.

14.2 Legislation and policy context

National legislation and policy

Infrastructure Planning (EIA) Regulations 2017

14.2.1 The Regulations introduced clear references to climate change, identifying the need to assess 'the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change'.

Climate Change Act 2008

14.2.2 The 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

[152] 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 August 2017).

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
- Establishing clear and regular accountability to the UK Parliament and to the devolved legislatures[153]

14.2.3 Key provisions of the act in respect to climate change mitigation include the requirement for the Government to set legally binding 'carbon budgets' capping the amount of greenhouse gas emitted in the UK over a 5-year period.

14.2.4 Key provisions of the act in respect to climate change adaptation include:

- A requirement for the Government to report, at least every 6 years, on the risks to the UK of climate change, and to publish a programme setting out how these will be addressed. This Act also introduces powers for Government to require public bodies and statutory undertakers to carry out their own risk assessment and make plans to address those risks
- The Adaptation Sub-Committee of the Committee on Climate Change, will provide advice to, and scrutiny of, the Government's adaptation work

The Carbon Plan 2011

14.2.5 The Carbon Plan was presented to Parliament pursuant to Sections 12 and 14 of the Climate Change Act 2008. The plan 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.

UK Climate Change Risk Assessment

14.2.6 This replaces the first UK climate change risk assessment, published in 2012 and fulfils the requirement of the Climate Change Act for the Government to report on the climate change risks to the UK every 5 years.

14.2.7 The government endorses 6 priority areas of risks and opportunities. The area of relevance to this scheme is:

- Flooding and coastal change risks to communities, business and infrastructure

[153] DECC (2012) Climate Change Act 2008

National Adaptation Programme

14.2.8 The National Adaptation Programme sets out over 370 actions for the UK Government, businesses, councils, civil society and academia to address the findings of the first UK Climate Change Risk Assessment (2012) and to build the nation's resilience to climate change. The programme addresses the requirement in the Climate Change Act to publish a programme for adaptation to climate change.

14.2.9 The programme contains the following objectives relevant to the scheme:

- Objective 1: To work with individuals, communities and organisations to reduce the threat of flooding and coastal erosion, including that resulting from climate change, by understanding the risks of flooding and coastal erosion, working together to put in place long-term plans to manage these risks and making sure that other plans take account of them;
- Objective 7: To ensure infrastructure is located, planned, designed and maintained to be resilient to climate change, including increasingly extreme weather events;
- Objective 9: To better understand the particular vulnerabilities facing local infrastructure from extreme weather and long-term climate change to determine actions to address the risks

National Policy Statement for National Networks

14.2.10 The NPSNN[154] contains a section on 'climate change adaptation', setting 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.

14.3 Assessment methodology

14.3.1 Assessment methodology for defining the significance of effects upon climate is contained within 15.12 of the Environmental Impact Assessment Scoping Report submitted to the Planning Inspectorate in November 2017. The Scoping Report can be accessed here:

14.3.2 https://infrastructure.planninginspectorate.gov.uk/projects/south-west/a303-sparkford-to-ilchester/?ipcsection=docs.

[154] 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 August 2017).

14.4 Study area

Effects on climate

14.4.1 The assessment will consider the greenhouse gas emission potential throughout the lifecycle of the scheme for both construction and operation.

Vulnerability of the scheme to climate

Spatial scope

14.4.2 The assessment will consider climate effects on the proposed scheme assets such as pavements, drainage and geotechnical receptors in addition to the in-combination effects of climate on the environmental receptors.

Temporal scope

14.4.3 The construction and operational effects on the proposed scheme as a result of climate change will be considered. The operational assessment will be informed by the lifespan of key elements within the scheme design and availability of UK Climate Projections.

14.5 Existing baseline

Effects on climate

14.5.1 In this context, existing carbon emissions from a variety of sources in the area are considered, including those from transport infrastructure. From a UK perspective, national greenhouse gas emissions in 2015 decreased by 38% from 1990. In 2015, UK net CO_2 emissions were estimated at 403.8 million tonnes, a decrease of 3.8% in comparison to 2014 levels[155]. In 2015, 24% of UK greenhouse gas emissions were from the transport sector with emissions of 120 $MtCO_2e$ in 2015.

14.5.2 Within the South Somerset region, the carbon emissions specifically from A roads in 2015 was 221.1$ktCO_2$, which represents a 13% decrease since 2005 and an 8.2% decrease in overall transport emissions[156]. There were 36.5 million vehicles licensed for use on roads in the UK in 2015, which is approximately 3.5 million extra vehicles. However, in 2015 the percentage of ultra-low emission vehicles (ULEVs) has reach 0.9% which is an 800% increase since 2013[157].

14.5.3 The UK construction industry is the largest consumer of natural resources with an average of over 400 million tonnes of material consumed every year. This

[155] 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 (last accessed August 2017).
[156] Local Authority Carbon Dioxide Emissions estimates 2015 (June 2017)- 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).
[157] Vehicle Licensing Statistics: Quarter 4 (Oct-Dec) 2015, Department for Transport (April 2016)- https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/516429/vehicle-licensing-statistics-2015.pdf (last accessed July 2017).

accounts for approximately 10% of the total UK carbon emissions [158].Therefore, approximately 40.38 million tonnes of CO_2 are attributed to the embodied carbon of construction materials.

Vulnerability of the scheme to climate change

14.5.4 The Met Office contains regional climate information for which Somerset is included in the south-west England[159] region. High-level climate observations for south-west England[160] over a 30-year averaging period between 1981-2010 are presented in Table 14.1 below.

Table 14.1: 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	South-west 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 south-west 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.

14.5.5 The flood zones within the scheme extents are displayed on the environmental constraints plan in appendix A.1.

14.6 Future projections

Effects on climate

14.6.1 The transport sector is a key driver in projected UK emissions increases with road transport emissions projected to rise by 28 $MtCO_2e$ over 2023-2027 (the fourth carbon budget)[161].

Vulnerability of the scheme to climate change

14.6.2 South-west England is predicted to experience changes in temperature, rainfall, and frequency of extreme weather events, particularly flooding as a

[158] Alinden, B. (2014) Embodied Energy and Carbon, ICE [online] available at: https://www.ice.org.uk/knowledge-and-resources/briefing-sheet/embodied-energy-and-carbon (last accessed July 2017).
[159] 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).
[160] 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).
[161] Department for Business, Energy and Industrial Strategy (2017) Updated Energy and Emissions Projections 2016 [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/599539/Updated_energy_and_emissions_projections_2016.pdf (last accessed June 2017).

consequence of climate change. These changes are predicted to occur under all 3 emissions scenarios (i.e. low, medium, and high greenhouse gas emissions), which are incorporated into the climate change models produced by the Met Office Hadley Centre. The general trend for the region is warmer and drier summers, and warmer and wetter winters.

14.6.3 Under the high emissions scenario for the 2080s, estimated changes in climatic conditions are outlined in Table 13.2 below.

Table 14.2: Future climate baseline for the 2080s

Climatic conditions	Climate observations
Temperature	The average summer temperature is estimated to increase by 5°C under the central estimate, which represents 'as likely as not' probability of change (50th percentile), and average winter temperature is estimated to increase by 3.4°C (50th percentile).
Rainfall	The average summer rainfall rate is estimated to decrease by 30%, whereas the average winter rainfall rate is estimated to increase by 31% (in the 50th percentile or central estimate).
Wind	Climate projections for wind are more uncertain than those for temperature and precipitation, due to inherent difficulty in modelling future wind conditions. However, overall an increase in extreme weather including wind is projected (Committee on Climate Change, 2017).

Source: UKCP09 Climate Projections

14.7 Consultation

14.7.1 Initial consultation has been undertaken with the Environment Agency during and will continue during the production of the ES to inform the Flood Risk Assessment (FRA). Consultation with the scheme design team and environmental topic specialists is currently on-going and details will be included within the ES.

14.8 Assumptions and limitations

14.8.1 Information on the climate baseline and future projections are based on freely available information from third parties, including the historical meteorological variables recorded by the Met Office and the UK Climate Projections (UKCP09) developed by the Met Office. In addition, the assessment has been informed by a selected range of existing climate change research and literature, available at the time of writing this assessment.

14.8.2 Climate projections are not predictions or forecasts but simulations of potential scenarios of future climate, under a range of hypothetical emissions scenarios and assumptions. Therefore, the results from running the climate models cannot be treated as exact or factual, but projection options. They represent internally consistent representations of how the climate may evolve in response to a range of potential forcing scenarios, and their reliability varies between climate variables. Scenarios exclude outlying "surprise" or "disaster" scenarios in the literature, and any scenario necessarily includes subjective elements and is open to various interpretations. Generally global projections are more certain than regional, and temperature projections are more certain than those for precipitation. Further, the degree of uncertainty associated with all climate change projections increases for projections further into the future.

14.8.3 Highways England has not independently verified the climate projections and does not accept responsibility or liability for any inaccuracies or shortcomings in

this information. Should the information sources be modified by the third parties we assume no responsibility for any of the resulting inaccuracies in any of our reports. Issued reports are relevant to the project information provided and are not intended to address changes in project configuration or modifications which occur over time.

14.8.4 Accordingly, any further research, analysis or decision-making should take account of the nature of the data sources and climate projections and should consider the range of literature, additional observational data, evidence and research available, and any recent developments in these.

14.8.5 It should also be noted that at present, there is no single accepted methodology for the assessment of climate change within Environmental Impact Assessments (EIAs). A qualitative methodology for assessing the vulnerability of the scheme to climate change will be produced in line with DMRB Volume 11 Section 2 Part 5. This will be updated as and when consolidated methodology or practice for this environmental factor is published.

14.8.6 Conclusions and recommendations may be revised within the ES, on the basis of updated information following further research, survey, and investigation.

14.9 Design and mitigation measures

Effects on climate

Construction

14.9.1 The scheme design aims to reduce the overall footprint of the scheme by re-using the existing A303 where practicable. Where the scheme is on-line, less materials would be required and land use change would be minimal, resulting in lower levels of CO_2 being emitted. This would also be the case for slip roads, as the road lengths and widths will be reduced where practicable.

14.9.2 The footprint of structures and junctions will be made as compact where practicable, ensuring minimal land use change and materials use.

14.9.3 The scheme design aims to balance the cut and fill, reducing the need to import additional fill material. Furthermore, the design aims to zone earthworks to avoid double handling, which will be achieved through early engagement with the Contractor. This will reduce the fuel consumption of plant, resulting in lower CO_2 emissions. Best practice construction techniques would be used to reduce effects from emissions from construction traffic and plant.

14.9.4 Throughout the scheme design, materials will be evaluated and their carbon emissions calculated. This will ensure that materials with lower carbon outputs are considered. For example, for the vehicle restraints system, steel containment barriers have been chosen over concrete, which saves 45kgCO_2e per meter of barrier.

14.9.5 Additional design, mitigation and enhancement measures in relation to materials can be found in section 10.9.

14.9.6 An assessment using Mott MacDonald's Carbon Portal (PAS2080 compliant)[162] and Mott MacDonald's Design for Resource Efficiency (D4RE) tool[163], in conjunction with the Carbon Reduction Hierarchy will be carried out as part of the on-going design work. Mott MacDonald's D4RE Tool assists in navigating between the various guidance, documents, and other internal and external tools available, to enable the project team to consider the concept of designing for resource efficiency.

Operation

14.9.7 Scheme operation would contribute to the production of greenhouse gases. However, further assessment as part of the ES is required to fully understand the difference between the scheme and the existing A303.

Vulnerability to climate change

Construction

14.9.8 A Construction Environmental Management Plan (CEMP) will be prepared by the appointed Contractor and implemented during the construction period. The CEMP would ensure that the construction of the scheme allows for adaptation to impacts of changes in climate, such as ensuring construction materials are covered when stored and pro-active planning to minimise adverse effects.

Operation

14.9.9 Measures to mitigate and adapt to the effects of climate change on the scheme assets and environmental receptors are outlined in Tables 13.3 and 13.4 respectively.

14.10 Assessment of effects

Effects on climate

Construction

14.10.1 The initial carbon assessment using the Carbon Portal has indicated that the scheme would release approximately 19,082 tCO_2e.

14.10.2 The carbon output specifically from the materials required for the scheme would be 16,153 tCO_2e. When compared to the 10% contribution from construction materials to the annual UK emissions, this only contributes 0.04%. (Refer to section 14.5.3 for further detail). Note that the annual UK emissions are in CO_2 and the scheme emissions in CO_2e.

[162] The Carbon Portal is Mott MacDonald's in-house carbon assessment tool. It assesses capital and operational carbon in projects.

[163] The Design for Resource Efficiency (D4RE) is Mott MacDonald's in-house tool is to assist in the navigation between the various guidance documents and other available internal and external tools, in order to enable the user to consider the concept of Designing for Resource Efficiency in their projects. The use of the D4RE Tool brings in the potential for widespread efficiencies in project delivery as well as the more efficient use of natural resources.

14.10.3 Emissions of 2,929 tCO_2e would be produced due to construction plant throughout the construction process. This would be reduced by implementing the early engagement with the Contractor to avoid double handling during earthworks.

14.10.4 The results of the carbon assessment for the construction stage of the scheme can be found in more detail in section 10.10. Chapter 10 Materials has been assessed to DMRB Simple level, so an overall significance of effect has not been in relation to carbon.

14.10.5 In absence of established assessment criteria for the effects on climate it is considered that the construction stage is not predicted to have an impact on climate due to the relatively low quantity of emissions in comparison to overall UK emissions for construction.

Operation

14.10.6 During operation, the scheme is predicted to cause an increase in emissions of 467,314tCO_2e in non-traded carbon over 60-years and 1,637tCO_2e in traded emissions. This has been established through the appraisal of greenhouse gas which has been undertaken in accordance with the Department for Transport's Transport Analysis Guidance (WebTAG) Unit A3, Chapter 4.

14.10.7 This increase in carbon would be caused primarily by an increase in traffic volume and flow along the route. Maintenance work undertaken on the scheme would also increase carbon, but to a much lesser extent compared to the projected road transport emissions.

Vulnerability to climate

14.10.8 This section details an assessment of the combined effects of climate change on scheme assets.

Scheme assets

Construction

14.10.9 It is not expected that climate change would result in a change in the risk of severe weather by the end of the 2.5 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.

Operation

14.10.10 A qualitative assessment of the effects of the projected changes in climate on the scheme assets during operation are presented in Table 14.3 below.

Combined effects of climate change on scheme assets

Construction

14.10.11 It is not expected that climate change would result in a change in the risk of severe weather by the end of the 2.5 year construction period. Despite this, extremes of weather may occur during construction however, would have a minimal adverse effect at worst on the environmental receptors. Therefore, changes in climate are not expected to greatly impact on the scheme construction.

Operation

14.10.12 An assessment of the effects of the projected changes in climate on the environmental receptors during scheme operation are presented in Table 14.4 below.

Table 14.3: Assessment of scheme assets

Asset	Life cycle asset aspect	Discussion	Mitigation / adaptation
Pavements	Foundation	Pavements have a typical design life of 40years and would therefore be affected by changes in climate. Increases in winter precipitation could result in increased sub-surface moisture content, decreasing foundation strength.	Consider foundations incorporating hydraulically bound materials or the use of reinforcement such as geotextiles.
		Changes in moisture content as a result of decreases in summer rainfall combined with increases in winter rainfall could cause soil to expand and shrink, causing pavement layers to heave.	Consider pavement structural design methodology. For example, specific non- frost / heave susceptible layers.
		Increased rainfall has the potential to saturate the unbound pavement construction, causing loss of fine material and settlement and subsequent premature pavement failure.	Plan for remedial work after long, wet periods.
	Surface	Increases in summer temperature have the potential to result in increased risk of surface failure, warping of slabs, excessive movement at joints and difficulty in maintaining asphalt surface profile during compaction.	Consider the use of polymer modified binders in surfacings to reduce temperature susceptibility and improve workability. Restrict laying concrete in high temperatures.
		Increases in winter precipitation could result in a build-up of particulates in the road surface, which can compromise the surfaces' skid resistance. In addition, skid resistance decreases in areas that are flooded.	Plan for remedial work after long, dry periods. Consider permeable pavements where appropriate.
Structures	Superstructure	Increases in temperature have the potential to increase the risk of joint and bearing failure.	Use integral structures to avoid the need for joints or use semi-integral details to reduce risk of failure.
		Increases in precipitation would increase deterioration rates for joints and surfacing, requiring more frequent replacement and traffic disruption.	More frequent maintenance and inspections assessing movement requirements for joints and the quality of joints.
		Increased winter precipitation could increase groundwater levels with the potential to cause large ground movements and soil settlement. In addition, increased precipitation could lead to flooding and scouring around foundations.	Ensure the drainage system can facilitate increases in precipitation.
		Increases in temperature and more variable precipitation may increase the frequency of maintenance painting of structural steelwork.	For existing structures, adopt better quality paint systems and specify weathering steel where practicable.
		An increase in wind speed and extreme wind events has the potential to lead to the failure of lighter structures by overturning.	More frequent inspections of lighter structures and foundation strengthening.
	Foundations and substructure	Increased winter precipitation could increase groundwater levels with the potential to cause large ground movements and soil settlement. In addition, increased precipitation could lead to flooding and scouring around foundations	Ensure the drainage system can facilitate increases in precipitation.
Drainage	Drainage system	An increase in winter precipitation would increase flood risk and the need for attenuation ponds. In addition, erosion of embankments, banks and footings.	Ensure the drainage system can facilitate increases in precipitation. Provide measures to protect against scour and undercutting of banks and foundations. Consider the provision of a road edge water collection system.
Geotechnics	Earthworks	Increased precipitation could increase risk to the earthworks stability.	Use of fill material that is less susceptible to moisture such as Pulverised Fuel Ash and aggregate.
		Reductions in summer precipitation and increases in temperature would reduce soil moisture, which demands a greater compactive effort.	Increase the frequency of compaction monitoring.

Asset	Life cycle asset aspect	Discussion	Mitigation / adaptation
Signs and signals	Advance Direction Sign (ADS)	An increase in wind speed and extreme wind events has the potential to affect the stability of ADSs, particularly as they have a design life of 15 years (Highways England, 2011).	Increase the frequency of inspection and maintenance of ADS.
	Road markings	Increases in precipitation and temperature have the potential to weather road markings.	Increase the frequency of inspection and maintenance of road markings.
Soft estate	Landscaping	Refer to Table 14.4	Refer to Table 14.4
Non-motorised User (NMU) Facilities	Underpasses	Increased precipitation has the potential to lead to underpasses flooding, deterring NMUs from their journey.	Ensure NMU diversions are in place in the event of an underpass flooding.
	NMU routes	Increases in temperature and reductions in summer rainfall have the potential to encourage a greater number of NMUs to use NMU facilities.	N/A.
		Increases in winter rainfall and wind events may discourage NMUs from undertaking journeys using NMU facilities.	Ensure that NMU facilities such as footpaths and signs are maintained frequently.
Maintenance	Operational maintenance	More frequent extreme weather and changes in temperature and precipitation would result in an increase in frequency of scheme maintenance as the scheme assets would be more susceptible to deterioration. In addition, extreme weather events have the potential to result in planned maintenance works requiring rescheduling due to unsuitable conditions.	Increase the frequency of inspection and maintenance of the scheme where practicable. Allow the occurrence of maintenance works to be flexible.
Vehicle restraint systems	Safety barriers	Steel safety barriers have a design life of approximately 25years. More frequent extreme weather and changes in temperature and precipitation may result in an increase in rate of deterioration of vehicle restraint systems.	Increase the frequency of inspection and maintenance of vehicle restraint systems.

Table 14.4: Combined effects of climate change on the environmental receptors during operation

Environmental receptor	Discussion	Mitigation/adaptation
Air Quality	Although meteorological conditions can affect ambient pollutant concentrations, for example by affecting cloud cover and therefore the photochemical conversion of NO_x to NO_2, future climate change is not considered to have the potential to change the conclusions of the air quality assessment. This is because predicted results are not sensitive to the likely degree of change in conditions expected.	N/A.
Cultural Heritage	There are no in-combination effects of climate change and the scheme operation on heritage assets.	N/A.
Landscape	An increase in temperature and changing precipitation patterns, particularly in summer months is likely to lead to an increase in long dry periods which may have a detrimental effect upon the establishment and long-term viability of mitigation planting introduced as part of the scheme. New planting will be particularly vulnerable to failure where appropriate watering is not available. Existing, more mature plants with a well-established root network are unlikely to be as vulnerable to change so quickly. However, the transplanting of more mature plants to give instant impact in mitigating a scheme, has the biggest risk to their survival as they require the greatest management intervention to ensure successful establishment. There is also the risk of an increase in disease associated with climate change which may see plant and tree species suffer. An increase in high wind events also puts existing and proposed planting at risk. This is particularly important in areas where existing trees have been removed and opens up the remaining trees to windthrow as their roots will not have developed in the same way as the trees that were once on the edge of the woodland / tree plot.	Selection of plant species which may have greater resilience to the change in climate and associated weather patterns. Selecting plant / tree sizes based on the likely amount of rainfall or water available to sustain them. Be cognisant of latest pests and diseases and likely impacts. Specify resistant cultivars if possible, or avoid using species if needed. Ensure effective woodland management practices are in place as a matter of course for general soft estate management (not just scheme specific). This would include an active management regime across the highways estate to prevent etiolated and vulnerable tree stock. Where tree clearance is required resulting in a newly exposed woodland edge, transitions should be made which will offer visual, biodiversity and stability benefits. This can be achieved through tapering, graduated densities or severance cuts. Further advice can be sought within the Forestry Commission document[164].
Biodiversity	Nitrate leaching from surface and groundwaters is more likely under a changing climate with higher temperatures and increased run-off events having implications for water quality and freshwater ecology. Freshwater ecosystems are very vulnerable to climate change because metabolic rates of organisms and overall rate of productivity of ecosystems are directly regulated by temperature. An increase in temperature may lead to changes in species distribution and abundance. It has already been observed that many warmth-loving species are moving northwards. This is notable in species such as amphibians, mammals, and invertebrates. Increase in temperature and precipitation in winter may cause plants to come into leaf earlier in the year. However, this can negatively affect species who rely on this food source and are no longer synchronised with those species which they depend (e.g. food plants and prey species). Conversely, drier summers may result in a detrimental effect upon the establishment and long-term viability of mitigation planting, which provides replacement habitat for a number of species.	Surface waters: Inclusion of pollution control devices within the scheme's drainage design, in accordance with the Sustainable Drainage Systems (SuDS) hierarchy. Groundwaters: Use of soakaways within the drainage design, if feasible, while ensuring pollution control devices are effective. Mitigation Planting: Selection of plant species which may have a greater tolerance to a changing climate and weather conditions. Mitigation Planting: Inclusion of species which provide a year-round source of food for wildlife.
Geology and Soils	Increases in temperature and windy conditions, may lead to increased erosion of exposed soils and fugitive dust emissions. The extent of exposed soils within the scheme area however would be limited to grass verges and landscaped areas.	Inclusion of pollution control devices within the scheme's drainage design, in accordance with the SuDS hierarchy.

[164] Forestry Commission (1996) Designing Forest Edges to Improve Wind Stability.

Environmental receptor	Discussion	Mitigation/adaptation
	Increases in precipitation may lead to increased volumes of water flowing through soil and potentially contaminated material, increasing the potential for on-site and off-site contaminant migration. Rainfall infiltration within the scheme area however would be limited, with the majority of surface water run-off discharges to the drainage system. Risk of flooding and increased precipitation may cause soluble contaminants that were previously located within the unsaturated zone to be mobilised, which could then migrate towards a sensitive receptor. Increased precipitation has the potential to cause overflowing / overtopping of below ground structures, releasing contaminants that were previously contained. Increased precipitation could cause a rise in the groundwater table, which has the potential to increase the migration of soil gas vapours through the soil profile and risk of accumulation in confined spaces.	
Materials	There are no in-combination effects of climate change and the scheme operation on materials.	N/A.
Noise and Vibration	Climate change may have direct and indirect influences on noise within the study area. For example, increases in ambient temperature would influence sound propagation by reducing attenuation of sound due to air absorption, as well as other factors such as temperature inversions. A warmer climate may also increase the tendency of building occupiers to open windows for ventilation thereby increasing internal noise levels in spaces used for working and sleeping. Increased rainfall would increase the likelihood of moisture on the carriageway surface which would result in an increase in noise from road traffic.	Surface water run-off would be attenuated within the scheme drainage design to ensure there is no increase in surface water run-off rates from the scheme.
People and Communities	Motorised travellers' driver stress: Frustration or fear from traffic jams or road closures/diversions due to extreme weather events including flooding and windy weather events such as storms. These extreme weather events could lead to standing water on the A303 road surface, affect motorists control of their vehicles and reduce visibility. Non-motorised users and severance: A change in climate could affect pedestrians through direct exposure in open spaces as well as impacts such as spray from passing vehicles. Adverse weather conditions could deter some NMUs from making journeys. This could also affect NMU access to the community facilities identified in section 12.5 of the People and Communities chapter. Agricultural land and individual farm businesses: A change in climate could alter the productivity of land, with yields and growing times potentially altered for different crops, whilst productivity of land used as pasture could also be affected. Extreme weather events such as drought and flooding would also potentially lead to losses in crop and crop disease. This could affect soil quality and agricultural land as a national resource and the viability of individual farm businesses.	Motorised travellers' driver stress: All proposed diversions and road closures would be sign posted clearly. The new drainage system would be designed to allow for flood events with the use of SuDS, with additional capacity for climate change. Safety measures comprising a continuous concrete barrier in the central reserve, a hard strip along the mainline and slip roads, lane markings, cats eyes, road restraint systems and road studs would be installed which would minimise fear of potential accidents for motorists. Non-motorised users and severance: A network of NMU facilities that are segregated from vehicle traffic would be included in the scheme design. Agricultural land and individual farm Businesses: Consultation with landowners to understand potential issues for their land. Measures designed to mitigate flooding would be considered in a Flood Risk Assessment (FRA) as part of the DCO application, but would consider use of SuDS to minimise drainage impacts for individual farms. Landscape/ecology planting measures would help provide ecosystem services, for example providing habitats for pollinating species, woodland for sheltering crops etc. from extreme weather events.
Road Drainage and the Water Environment	Surface waters: An increase in water temperature would reduce the ability of surface water to absorb dissolved oxygen, which could affect aquatic ecology. A decrease in summer rainfall could also affect aquatic ecology and downstream water users (abstractions or recreational users) as low flows and drought conditions may become more common and more severe. This could also limit the	Surface waters: Inclusion of pollution control devices within the scheme's drainage design, in accordance with the SuDS hierarchy. Groundwaters: Use of soakaways within the drainage design, if feasible, while ensuring pollution control devices are effective.

Environmental receptor	Discussion	Mitigation/adaptation
	ability of the watercourses to accommodate discharges from road run-off without further water quality deterioration. Groundwaters: A decrease in summer rainfall could lead to aquifer depletion during the summer, and increased intensity winter rainfall events may not allow effective aquifer recharge, as surface run-off could increase and infiltration could decrease. Flood risk: An increase in winter rainfall and increased intensity rainfall events would increase flooding.	Flood risk: A Flood Risk Assessment (FRA) will be carried out to support the DCO submission and the drainage design for the scheme will include an allowance for climate change, to ensure no increase in flood risk to or from the scheme in the future.

14.11 Monitoring requirements for significant adverse effects

14.11.1 Any requirements for monitoring will be detailed within the ES.

14.12 Conclusions

Effects on climate

14.12.1 At this stage, it is anticipated that due to the quantity of materials required for the scheme, further assessment would be required during construction using the Highways England Carbon Tool[165] and Mott MacDonald's D4RE tool in conjunction with the Carbon Reduction Hierarchy. This assessment will be included within the ES to support the DCO application.

14.12.2 During operation, effects on climate are anticipated to be Neutral. No further assessment for the effects on climate during operation is required due to the limited carbon emissions during scheme operation.

Vulnerability to climate

14.12.3 During construction, Neutral effects are anticipated for the scheme associated with the vulnerability to climate. Due to the temporary nature of construction and limited changes in climate over the 2.5 year construction period, changes in climate are not expected to significantly affect scheme construction therefore further assessment during construction is not required.

14.12.4 During scheme operation, there is the potential for scheme assets and environmental receptors to be affected by changes in climate.

[165] Highways England (2015) Carbon Emissions Calculation Tool [online] available at: https://www.gov.uk/government/publications/carbon-tool (last accessed November 2017).

15 Combined and cumulative effects

15.1 Introduction

15.1.1 This chapter presents the on-going work for the assessment of the potential Combined and Cumulative effects from the respective topic-specific technical chapters of this report (chapters 6 - 14); defines inter-relationships between these assessments and any other developments in the surrounding area; and establishes whether there are any other residual effects on the identified sensitive receptors which may require additional mitigation not previously identified.

15.1.2 Combined and cumulative effects result from multiple actions on receptors over time and are generally additive or interactive (synergistic) in nature. They can also be considered to be effects resulting from incremental changes caused by other past, present or reasonably foreseeable actions, together with the project, identified as:

- Combined effects from a single project (the interrelationship between different environmental factors);
- Cumulative effects from different projects (with the project being assessed)

15.1.3 DMRB Volume 11, Section 2, Part 6 states that, in general, cumulative assessment will be most successful when the assessment of all other environmental effects of the project is complete.

15.2 Legislation and policy context

National Policy Statement for National Networks

15.2.1 The need to consider cumulative effects in planning and decision making is set out in planning policy, in particular the National Policy Statement for National Networks (NPSNN)[166]; paragraph 4.16 states that *"When considering significant cumulative effects, any environmental statement should provide information on how the effects of the applicant's proposal would combine and interact with the effects of other development (including projects for which consent has been granted, as well as those already in existence)."*

15.3 Assessment methodology

15.3.1 Assessment methodology for defining the significance of combined and cumulative effects is contained within 16.11 of the Environmental Impact Assessment Scoping Report submitted to the Planning Inspectorate in November 2017. The Scoping Report can be accessed here:

[166] Department for Transport (2014) National Networks National Policy Statement: Presented to Parliament pursuant to Section 9 (8) and Section 5 (4) of the Planning Act 2008. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/387222/NNNPS-print.pdf (Accessed January 2018).

15.3.2 https://infrastructure.planninginspectorate.gov.uk/projects/south-west/a303-sparkford-to-ilchester/?ipcsection=docs.

15.4 Study area

Combined effects

15.4.1 The study area for the assessment of combined effects of the scheme, for both construction and operation, is defined by the study areas identified within the relevant environment topic chapters of this report (Chapters 5 – 14), ranging from 200 metres (for air quality) to 2 kilometres (for nature conservation).

Cumulative effects

15.4.2 The study area for the identification of other developments for inclusion in the assessment of cumulative effects reflects a 2 kilometres Zone of Influence (ZOI) around the boundary of the scheme, for both construction and operation. DMRB Volume 11, Section 2, Part 5, states that the study area for the assessment of cumulative effects should be defined on a case-by-case basis reflecting the scheme in question and the area over which significant effects can reasonably be considered to have the potential to occur from both the scheme and in combination with other developments. On this basis, given the scope and scale of the proposed works, the study area used for the identification of other developments, for the assessment of cumulative effects of the scheme is 2 kilometres.

15.4.3 The study area used for the assessment of cumulative effects during both construction and operation reflects the individual ZOIs of the topic chapters, outlined in Table 15.1 below. Table 15.1 below does not include study areas for air quality, noise and vibration, or climate, as these topics are not being taken forward as part of this cumulative effects assessment (see paragraph 15.8.6 of Section 15.8 Assumptions and Limitations for further details).

15.4.4 As such, the assessment of cumulative effects has been undertaken on a topic-by-topic basis, with the assessment of ‘other developments’ in combination with the scheme only undertaken where the ZOIs for the same topic chapter overlap.

Table 15.1: Environmental topic zones of influence

Environmental topic	Zone of Influence (ZoI)
Cultural Heritage	• **Construction and Operation:** A 1km ZOI which is the maximum ZOI extent used within the Cultural Heritage assessment, allowing a full understanding of the context and setting of the heritage assets. In addition to this, the following study area was also used: ○ 200m ZOI for Listed Buildings and Conservation Areas. • See chapter 6 Cultural Heritage for further information.
Landscape	• **Construction and Operation:** 1km ZOI for landscape and visual impacts. • See chapter 7 Landscape for further information.
Biodiversity	• **Construction and Operation:** A 2km ZOI which is the maximum ZOI extent used within the Biodiversity Assessment. • See chapter 8 Biodiversity, for further information.
Geology and Soils	• **Construction and Operation**: All locations where physical works and ground disturbance would take place, plus a 250m buffer • See chapter 9 Geology and Soils for further information
Materials	• **Construction:** ZOI defined by the influence of the scheme, rather than through a set geographical location – quantity of materials required and generation of waste • Operational phase not assessed • See chapter 10 Materials for further information

People and Communities	• **Construction and Operation:** A 250m ZOI for Non-Motorised Users, Amenity, Severance, and Driver Stress. Other topics are as follows:
	  ○ For agricultural land, the study area encompasses land directly within the scheme footprint; this has therefore not been included as part of the cumulative effects assessment
	  ○ For motorised travellers views from the road, the study area considers views from the proposed route alignments; this has therefore not been included as part of the cumulative effects assessment
	  ○ For demolition of private property and associated land take, the study area encompasses a specific area on and immediately adjacent to the scheme alignment; this has therefore not been included as part of the cumulative effects assessment
	• See Chapter 12 People and Communities for further information

15.5 Existing baseline

Combined effects

15.5.1 The baseline for each environmental topic is described in detail for air quality, cultural heritage, landscape, nature conservation, geology and soils, materials, noise and vibration, people and communities, and climate, all contained in the preceding chapters of this PEI report (chapters 5 - 14).

Cumulative effects

15.5.2 Numerous other developments have been identified using South Somerset District Council's Interactive Planning website[167], South Somerset District Council's Housing and Economic Land Availability Assessment (HELAA)[168], the Traffic Team's Uncertainty Log, and the Planning Inspectorate's Programme of Projects (although no NSIPs are proposed within the 2km study area). These developments are identified in Table 15.2 under 'Stage 1' and represent the Long List of other developments.

15.5.3 The Long List of other developments identified has been reduced to a Short List using the inclusion / exclusion criteria.

15.5.4 Appendix E.1 builds on the information given in Table 15.2, identifying the Long List of other developments, and shows the sifting process undertaken to development a Short List. This table format has been advised within the Advice Note 17[169].

15.5.5 The drawings contained in appendix E.2 shows the locations of these other developments contained within the Short List in relation to the overall study area for cumulative effects. The drawings contained within appendix E.2 show the location of each of the other developments in relation to the scheme, and the respective ZOIs that these other developments fall into.

[167] South Somerset District Council (2017) Planning Interactive Map [online] available at: https://www.southsomerset.gov.uk/your-area/ (last accessed August 2017).
[168] 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).
[169] The Planning Inspectorate (2015) Advice Note Seventeen: Cumulative Effects Assessment relevant to nationally significant infrastructure projects [online] available at: http://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2015/12/Advice-note-17V4.pdf (Last accessed August 2017).

Table 15.2: Other developments identified at Stage 1, and the inclusion of developments in the Short List at Stage 2

Long List of other developments identified at Stage 1		Short List of other developments identified at Stage 2
ID	'Other development' name and reference	
1	Rectory Farm HELAA Site Ref No.: E/QUCA/0001/A	No
2	Rectory Farm HELAA Site Ref No.: E/QUCA/0001/B	No
3	Rectory Farm HELAA Site Ref No.: E/QUCA/0001/C	No
4	Long Hazel Farm (caravan park) HELAA Site Ref No.: E/SPAR/0001	No
5	The Orchard HELAA Site Ref No.: E/SPAR/0003	No
6	Land off Wolverlands HELAA Site Ref No.: E/SPAR/0004	No
7	Haynes Publishing HELAA Site Ref No.: E/SPAR/0005	No
8	Land at Brains Lane HELAA Site Ref No.: E/SPAR/1200	No
9	Land West of Cadbury Business Park HELAA Site Ref No.: E/NOCA/0003	No
10	Outline planning application seeking permission for mixed use redevelopment (residential / commercial) together with associated works and access ways. 16/00725/OUT	Yes
11	Propose 8 Hectares Photovoltaic Park 15/02779/EIASS	No
12	Proposed hotel, events area and exhibition track at land at and opposite Haynes Motor Museum, Sparkford 10/01023/EIASS	No
13	Construction of a new single storey primary school 14/04945/R3C and 15/00788/R3C	No
14	Proposed straw barn, landscape bund and associated ancillary works (revised scheme – 16/01219/FUL) 16/03193/FUL	No
15	Outline application for the erection of up to 150 dwellings, site access, provision of associated landscaping and open spaces / play facilities (GR 352508/123950) 15/00024/OUT	Yes

15.6 Value (sensitivity of resources and receptors)

15.6.1 The value of resources and receptors has been described within each of the environmental discipline chapters (chapters 5 to 14) of this report, and have been brought forward into this assessment of combined and cumulative effects.

15.7 Consultation

15.7.1 To date, there has been no specific consultation relating to the combined and cumulative effects assessment. As part of the ES, South Somerset District Council's Planning Team will be consulted and asked to review the Long List and Short List of other developments to be included within the Combined and Cumulative Effects assessment of the ES.

15.8 Assumptions and limitations

15.8.1 This assessment is made using professional judgement and based on currently available information. It is likely that some of the environmental effects within this chapter would be superseded as detailed design for the other developments included in this assessment continues. Furthermore, it should be highlighted that additional other developments may be proposed following the

submission of this report. These changes will be captured as part of the assessment of combined and cumulative effects within the ES.

15.8.2 Where an assessment has not been undertaken for certain environmental topics for a proposed development, it has been assumed that the environmental topics missing have been previously scoped out because no environmental impacts are predicted, and as such, Neutral effects have been assigned to these environmental disciplines.

15.8.3 It should also be noted that the assessment of likely significant environmental effects will differ slightly across the proposed developments as a result of assessments being undertaken by multiple parties with variations in professional opinion. In addition, some assessments may have taken a balanced approach to the assessment of effects, whilst other assessments may take a worst-case approach.

15.8.4 It is important to note that the overall conclusions have been carried forward from the environmental studies/assessments of the other developments and have not been altered or challenged. Where an environmental assessment or study for 1of the other developments did not provide an overall assessment of effect, this has been assigned based on professional judgement and based on the information provided as part of the planning application.

15.8.5 In all instances, the construction start and finish dates are not available for the other developments, and have not been confirmed with South Somerset District Council at this stage. As such, it has been assumed that either part or all of the construction phase will fall within the scheme's construction phase, reflecting a worst-case scenario approach.

15.8.6 The A303 Stonehenge has submitted a Scoping Report to the Planning Inspectorate and has subsequently received a Scoping Opinion. This proposed scheme will be reviewed and included as 'other developments' for consideration within the Combined and Cumulative Effects assessment for the ES.

15.8.7 The South Somerset Housing and Employment Land Availability Assessment[170] has identified a number of proposed development areas, within the 2kilometres study area for cumulative effects; these are identified in the Long List of other developments contained in appendix E.1. However, these developments have not been taken forward into the Short List.

15.8.8 Due to the nature of the air quality and noise and vibration assessments, which have used traffic data partly generated by the Traffic Team's Uncertainty Log, it has been considered that an adequate cumulative effects assessment for each of the other developments included within the Short List has already been undertaken and captured within chapter 5 Air Quality, and Chapter 11 Noise and Vibration.

[170] South Somerset District Council (2017) Housing and Economic Land Availability Assessment [online] available at: 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 July 2017).

15.8.9 In terms of the combined effects of climate, all other receptors have the potential to be affected by climate change. A qualitative assessment of these effects has been included within Table 14.3 of chapter 14 Climate, and as such, have not been included further in this assessment.

15.8.10 The cumulative effects associated with climate have not been assessed as part of this chapter. This will be assessed as part of the ES, following the completion of detailed flood modelling, noise modelling, and a detailed carbon assessment for the preferred option, and will be included as part of the Combined and Cumulative Effects chapter of the ES.

15.9 Design and mitigation measures

15.9.1 At this stage, there are no measures required as part of the scheme design, and no mitigation measures to be included for construction or operation.

15.10 Assessment of effects

Combined effects

Construction

15.10.1 The overall significance of the combined effects during the construction phase has been assessed as being Not Significant Adverse, taking into consideration any proposed mitigation from the preceding chapters of this report. Table E.3.1 in appendix E.3 provides further details of how these effects have been combined as a result of their individual significance on receptors during construction.

15.10.2 In terms of the geology and soils of the local area, on balance a combined Slight Adverse effect is anticipated during construction. Slight Adverse effects have been reported as a result of the permanent removal of soils where excavation works would be carried out during earthworks and foundation construction, as well as the potential for soil deterioration and consolidation due to material storage and vehicle usage on site.

15.10.3 A combined Moderate Adverse effect is anticipated on the landscape of the area during construction, with the local landscape character likely to be adversely affected through the temporary presence of construction traffic, plant and equipment, the introduction / removal of built structures, temporary security fencing, vehicle movements, and the loss of mature tree and vegetation. The historic landscape would also experience Moderate Adverse effects on balance during construction as a result of the preceding factors.

15.10.4 During construction, the combined effects upon heritage features are expected to be Slight to Moderate Adverse, due to the potential disturbances to archaeological remains and heritage assets within the footprint of the scheme. In addition, construction activities associated with the scheme are expected to have significant adverse effects to the setting of designated historic assets for a temporary period, as reported in chapter 6 Cultural Heritage.

15.10.5 A combined Not Significant Adverse effect is anticipated on community receptors during the construction phase of the scheme. There is the potential for Significant Adverse effects to visual receptors during construction, due to the temporary presence of construction traffic, plant and equipment, the introduction / removal of built structures, temporary security fencing, vehicle movements, and the loss of mature trees and vegetation. However, it is unlikely that there would be any significant effects to the local air quality as a result of the construction phase, due to the temporary nature of the works. An on- balance Slight Adverse effect has been reported to the communities receptor as part of chapter 12 People and Communities, and effects associated with noise and vibration as a result of construction activities are anticipated to be Not Significant Adverse, with best practice mitigation measures in place.

15.10.6 A combined Moderate Adverse effect is anticipated for vehicle travellers as a result of the scheme, due to the presence of traffic management and diversions, which could cause driver stress throughout the duration of the works for a temporary period. No other effects combine to exacerbate the potential effects on this receptor.

15.10.7 A combined Slight Adverse effect is anticipated on the water environment during the construction phase of the scheme. There is the potential for contaminated land to result in an effect upon the water environment, as reported within chapter 9 Geology and Soils. In addition, Slight Adverse effects are reported within chapter 8 Biodiversity for aquatic environments.

15.10.8 A combined Not Significant Adverse effect is anticipated on ecological receptors during the construction period for the scheme, with best practice mitigation measures in place. This combined effect takes into consideration the on-balance Slight Adverse effect reported as likely within the Biodiversity chapter and the Not Significant Adverse effects reported on the Site of Special Scientific Importance (SSSI) within chapter 5 Air Quality. A Neutral Slight Adverse effect on flora is also reported within chapter 9 Geology and Soils, included within this category due to the potential for impairment of landscape and grassland redevelopment; however, effects are not considered to be significant.

15.10.9 A combined Significant Adverse effect is anticipated for materials during construction as a result of the scheme, largely due to the potential for significant effects reported within chapter 10 Materials. It is also important to note the Slight Adverse effects to materials reported within chapter 9 Geology and Soils

15.10.10 The overall combined effect on climate is anticipated to be Not Significant Adverse. This takes into consideration just the potential effects to climate change reported within chapter 14 Climate Change, which are anticipated to be Slight Adverse.

15.10.11 A combined Not Significant Adverse effect is anticipated for the Human Health and Wellbeing receptor during construction for the scheme. This is as a result of potential effects anticipated for air quality, noise and vibration, people and communities, as well as for geology and soils (relating to the effects on construction workers).

15.10.12 In summary, the potential temporary combined effects as a result of the scheme are considered to be, on balance, Not Significant Adverse, as shown in Table E.3.1 contained in appendix E.3.

Operation

15.10.13 The overall significance of the combined effects for the scheme during operation has been assessed as Not Significant Adverse, taking into consideration mitigation proposed in the preceding chapters of this report. Table E.3.2 in Appendix .3 provides further details of how these effects have been combined as a result of their individual significance on receptors during operation.

15.10.14 In terms of geology and soils, a combined Neutral effect is anticipated once the scheme is in operation. This on balance combined effect has been reached because chapter 9 Geology and Soils has scoped out the assessment of effects during operation.

15.10.15 Once operational, an on balance Not Significant Adverse effect is anticipated on the local landscape as a result of the scheme. Slight Adverse effects are predicted for landscape character at Year15 due to the loss of vegetation following the completion of construction. In terms of the historic setting of the landscape, again Slight Adverse effects are anticipated largely as a result of Neutral or Slight Adverse effects for heritage assets. In addition, as described in chapter 8 Biodiversity, and with the implementation of mitigation described in chapter 8, the effect of the loss of habitats including vegetative corridors would be Slight Adverse, improving to Neutral following the maturation of planting.

15.10.16 During operation, the combined effects upon cultural features are expected to be on balance Not Significant Adverse, largely as a result of additional visual and noise effects (described in chapter 7 Landscape) affecting the setting of the assets from vehicle movements and street lighting, and the effects to Hazlegrove Registered Park and Garden.

15.10.17 Once operational, the combined effects upon communities are considered to be on balance Not Significant Adverse. The effects to air quality are anticipated to be Not Significant Adverse, and a combined Slight Adverse effect is anticipated as a result of People and Communities, which considers agricultural land, non-motorised users, amenity, severance, individual farm businesses, demolition of private property, land take, and motorised travellers view from the road. At Year 15, Slight Adverse effects are anticipated to visual receptors, as reported within chapter 7 Landscape. Effects to communities as a result of noise are anticipated to have the potential for Significant Adverse effects, but it is important to note that other receptors would benefit from noise reductions.

15.10.18 Once operational, combined effects on vehicle travellers are expected to be Not Significant Beneficial, with Slight Beneficial effects reported for to driver stress for the scheme, with reduced congestion and decreased levels of driver frustration, with vehicle travellers able to drive along the road at a more

consistent speed, giving improved journey time reliability (chapter 12 People and Communities).

15.10.19 In terms of the water environment, an on balance Neutral effect is anticipated during operation of the scheme. Chapter 8 Biodiversity considers the potential changes to water quality and the effects that poses to macroinvertebrates; effects are anticipated to be insignificant, and with the on-balance effect reported for Biodiversity as Slight Adverse reducing to Neutral, the overall combined effect on the water receptor during construction is anticipated to be Neutral.

15.10.20 An on balance Not Significant Adverse effect is anticipated on ecological receptors during the operation of the scheme. It is important to note from both chapter 5 Air Quality and chapter 8 Biodiversity, that there is potential for Significant Adverse effects to at least a proportion, if not all, of the Stockton Wood and Down SSSI, associated with the airborne pollutants and nitrogen deposition. However, operational effects on the other designated areas, habitats and protected species are anticipated to have an on-balance Slight Adverse effect, reducing to Neutral the longer-term, following the proper establishment of vegetation.

15.10.21 There are not anticipated to be any residual adverse effects to materials once the scheme is in operation, and as such, combined effects are reported as Neutral.

15.10.22 There are not anticipated to be any residual combined effects to the climate during operation.

15.10.23 A combined Not Significant Adverse effect is anticipated for the Human Health and Wellbeing receptor during operation for the scheme. This is as a result of the potential effects, none of which are considered to be Significant, anticipated for air quality, noise and vibration, and people and communities.

15.10.24 The potential combined effects as a result of the scheme are considered to be, on balance, Not Significant Adverse, as shown in Table E.3.2 in appendix E.3.

Cumulative Effects

15.10.25 The assessment of cumulative effects for both construction and operation can be found in appendix E.4.

15.10.26 Only those developments that have been included in the Short List (Stage 2) have been brought through to the assessment of cumulative effects, which represents Stages 3 and 4 of the methodology outlined in the Planning Inspectorate's 'Advice Note17: Cumulative Effects'[171] (see paragraph 15.3.6 for a description of the stages of assessment). The assessment has been split by

[171] The Planning Inspectorate (2015) Advice Note Seventeen: Cumulative Effects Assessment relevant to nationally significant infrastructure projects. Available online at: http://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2015/12/Advice-note-17V4.pdf (Last accessed August 2017).

environmental topic, and the effects of the other developments have been assessed where the ZOIs for each environmental topic overlaps. Due to the locations of the proposed developments, there are none for which ZOIs overlap for just 1of the proposed developments.

15.10.27 Table 15.3 provides a summary of the residual effects for each of the 'other developments' and the relevant environmental topics during construction, and Table 15.4 summarises the residual cumulative effects during operation.

15.10.28 An overall cumulative effect of Not Significant Adverse is anticipated as a result of all of the other developments during construction. As such, no further mitigation is required as there are no significant cumulative effects predicted.

15.10.29 An overall cumulative residual effect of Not Significant Adverse is anticipated as a result of all of the other developments during operation. As such, no further mitigation is required as there are no significant cumulative effects predicted.

Table 15.3: Summary of the cumulative residual effects for the other developments during construction

ID	Other Development name	Residual Cumulative Effects of 'other development' for each environmental topic during construction				
		Cultural Heritage	**Landscape**	**Biodiversity**	**Geology and Soils**	**People and Communities**
10	Former Haynes Publishing Site 16/00725/OUT	Buried Archaeology: Significant Adverse Heritage Assets: Significant Adverse	Landscape Character: Significant Adverse Visual Effects: Significant Adverse Effects	Slight Adverse	Slight Adverse	Slight Adverse
15	Land North of Troubridge Park 15/00024/OUT					
Overall cumulative effect for each environmental topic during construction		Significant Adverse	Significant Adverse	Not Significant Adverse	Not Significant Adverse	Not Significant Adverse
Overall cumulative effect during construction		**Not Significant Adverse**				

Table 15.4: Summary of the cumulative residual effects for the 'other developments' during operation

ID	Other Development name	Residual cumulative effects of Other Developments for each environmental topic during operation				
		Cultural Heritage	**Landscape**	**Biodiversity**	**Geology and Soils**	**People and Communities**
10	Former Haynes Publishing Site 16/00725/OUT	Heritage Assets: Not Significant Adverse	Landscape Character: Slight Adverse Visual Effects: Slight Adverse	Slight Adverse, reducing to Neutral	Neutral	Slight Adverse
15	Land North of Troubridge Park 15/00024/OUT			Slight Adverse, reducing to Neutral		
Overall cumulative effect for each environmental topic during construction		Not Significant Adverse	Not Significant Adverse	Not Significant Adverse, reducing to Neutral	Neutral	Not Significant Adverse
Overall cumulative effect during construction		**Not Significant Adverse**				

15.11 Monitoring requirements for significant adverse effects

15.11.1 At the time of writing, no significant adverse effects are anticipated and so monitoring requirements are currently not envisaged to be necessary. Monitoring requirements will be updated as part of the ES should significant adverse effects be predicted following an update to the assessment.

15.12 Conclusions

15.12.1 The assessment for combined effects involved the identification of impact interactions associated with the scheme upon separate environmental receptors. The methodology for the assessment of combined effects followed DMRB Volume 11 Section 2 Part 5: Assessment and Management of Environmental Effects.

15.12.2 In summary, the residual combined effect during construction for the scheme is anticipated to be Not Significant Adverse. The residual combined effect during operation for the scheme is anticipated to be Not Significant Adverse and therefore not considered to be significant.

15.12.3 The assessment for cumulative effects has involved the identification of incremental changes likely to be caused by other developments together with the scheme. This assessment has followed the methodology outlined in the Planning Inspectorate's 'Advice Note17: Cumulative Effects Assessment'.

15.12.4 The residual cumulative effects during construction as a result of all of the other developments with the scheme would be anticipated to be Not Significant Adverse. During operation, residual cumulative effects for the scheme would be anticipated to be Not Significant Adverse.

15.12.5 Further detailed assessment of the combined and cumulative effects would be required as part of the ES. The list of proposed developments to be included within the cumulative effects assessment would be developed with South Somerset's Planning Team to ensure that all necessary developments are captured as part of the assessment, and to ensure that construction start dates and lengths are fully understood.

16 Conclusions

16.1.1 Table 16.1 presents the conclusions of each of the specialist topics included within the Preliminary Environmental Information (PEI) report.

Table 16.1: Summary table

Topic	Stage (construction / operation)	Proposed mitigation	Description of potential effect	Likely significance of residual effect after mitigation	Overall likely significance of effect
Air Quality					
Local Air Quality - Human Health and Wellbeing Effects	Construction	Best Practicable Means (BPM), as described in Section 79 (9) of the Environmental Protection Act 1990, will be carried out to reduce emissions which may affect air quality. This will also include a Construction Environmental Management Plan (CEMP).	The potential for local air quality could be affected through the generation and subsequent deposition of construction dust arising from construction activities and vehicle movements.	Not Significant Adverse	Not Significant Adverse
Local Air Quality - Human Health and Wellbeing Effects	Operation	No operational air quality specific mitigation measures are required.	No exceedances of air quality objectives are predicted at human receptors in the Do Minimum and DoSomething scenario, and therefore effects are not expected to be significant.	Not Significant Adverse	Not Significant Adverse
Local Air Quality - Ecological Effects	Operation	No operational air quality specific mitigation measures are required.	The potential for exceedance of the NO_X critical level.	Significant Adverse	Significant Adverse
Regional Air Quality	Operation	No operational air quality specific mitigation measures are required.	The scheme is predicted to cause small changes in regional emissions during operation, although these are small compared to national emissions.	Not Significant Adverse	Not Significant Adverse
Cultural Heritage					
Heritage Assets	Construction	Where impacts to heritage assets are unavoidable, mitigation to be included as part of the design to reduce effects to setting, including planting, screening, noise attenuation and appropriate lighting. Best practice mitigation measures to limit impacts during construction to be included within a CEMP.	Potential for significant adverse effects to the setting of Scheduled Monuments and Listed Buildings within close proximity of the route option, due to noise during construction, and the presence of construction plant. In particular, potential for a moderate / large adverse effect to Hazlegrove House (Grade II Listed) Registered Park and Garden due to the total loss of approximately the southern third of the park.	Significant Adverse	Significant Adverse
Sub-Surface Archaeological Remains	Construction	Preserving archaeological remains in-situ would be explored during the design process. Best practice mitigation measures to limit impacts during construction to be included within a CEMP.	Potential for significant adverse effects associated with the permanent removal of sub-surface archaeological remains.	Significant Adverse	
Heritage Assets	Operation	No mitigation measures have been developed at this stage. Mitigation measures, including placement of bunds, noise attenuation screening, and appropriate lighting, will be explored as part of the Environmental Statement.	Effects are likely to be either Neutral or Slight Adverse for heritage assets once the scheme is in operation. Neutral effects are predicted where there are unlikely to be any operational differences to the current arrangement that would alter the setting of these heritage assets. Slight Adverse effects are generally reported where road noise may be slightly more noticeable.	Slight Adverse	Slight Adverse
Sub-Surface Archaeological Remains	Operation	No mitigation measures required.	There will be no effects to sub-surface archaeological remains from the operation of the scheme. Any potential impacts on these types of heritage assets will have been encountered during the construction phase.	Neutral (no effects anticipated)	
Landscape and Visual Effects					
Landscape Character and Visual Amenity	Construction	Best practice measures to be included within a CEMP.	Introduction of new detracting features to the local landscape and within the view, due to: • Presence of construction traffic, plant and equipment • Introduction / removal of built structures • Storage of topsoil mounds • Movement of excavated earth and change in the landform on site • Temporary security fencing • Presence of a construction compound • Vehicle movements including private vehicles belonging to staff • Removal of mature trees and vegetation • Presence and views of lighting for compounds and floodlighting when night work is required	Significant Adverse	Significant Adverse
Landscape Character and Visual Amenity	Operation	Lowering of vertical alignment of the route including junctions, wherever practicable. Implementation of earth bunds. Appropriate landscape design including native hedgerows, hedgerows and trees, and block of planting. Lighting columns to be kept to a minimum height and be directional. Any new structures to have a low solid to void ratio and consideration given to colour, form and materials.	The scheme would be at odds with the local landscape pattern and scale and be visible from local visual receptors, due to: • Increased road infrastructure • Loss of mature vegetation within and outside the existing highway boundary • Additional slip roads and grade-separated roads and junctions increasing the overall width and perception of the road Direct impact upon the views from the south of the designated Hazlegrove House (Grade II Listed) Registered Park and Garden.	Slight Adverse	Slight Adverse
Biodiversity					
Qualifying species for Natura 2000 sites	Construction	If bat roosts are found, requirements of the European Protected Species (EPS) licence conditions will guide the landscape planting and other mitigation (to avoid disturbing bat roosts). Mitigation for foraging and commuting routes will include habitat enhancement and compensation; green bridge or similar structure to maintain connectivity, off-setting habitat loss. Landscaping design will provide a barrier between active road and wider landscape. Vegetation clearance and earthworks to be supervised by a suitably experienced ecologist. Lighting and noise disturbance will be minimised through implementation of method statement. Operational lighting is not currently in the design, however, if required, follow best practice guidelines regarding light spill, and wave length.	No adverse effects anticipated.	Neutral (construction and operation)	Slight Adverse

Topic	Stage (construction / operation)	Proposed mitigation	Description of potential effect	Likely significance of residual effect after mitigation	Overall likely significance of effect
		At detailed design stage, the requirement for and type / number of bat boxes to be installed will be finalised.			
Nationally Designated Sites	Construction	Replacing lost habitat such as woodland, grassland and hedgerows. In terms of the botanical and invertebrate assemblages present, appropriate mitigation will be informed by the invertebrate and / or habitat surveys. This may include the translocation of plants / invertebrates to newly created habitats.	SSSI is located over 300m from the scheme and outside the ZoI for air quality effects, no mitigation required. Direct effects will be avoided where practicable. However, direct effects may be due to the loss of habitat.	Neutral	
Priority Habitats	Construction	Measures to mitigate the effects of dust on sensitive habitats could include the use of screens and sediment booms. Cutting, grinding or sawing equipment should use suitable dust suppression techniques such as water sprays or local extraction. To minimise adverse effects on watercourses and associated species, measures would be taken to prevent or minimise any sediments entering the freshwater, using control measures as outlined in CIRIA C532 Control of Water Pollution from Construction Sites. It is recommended that where hedgerows are removed to facilitate the works, these be replaced within the same location and any existing gaps planted with appropriate native species, where practicable.	Loss of habitat	Slight Adverse	
Protected and Notable Species	Construction	If the presence of EPS is confirmed and adverse effects are unavoidable, the legal requirements of the EPS licence conditions and the requirement of 'no net loss in biodiversity' in line with Section 40 of the NERC Act 2006 will guide the landscape planting requirements. In addition to habitat enhancement for protected species, mitigation and compensation with regards to offsetting habitat loss will also be required. The loss of any habitat of conservation value would be replaced like-for-like as a minimum requirement. Sensitive working methods will ensure that the risk of killing, injuring or disturbing any EPS is minimised.	Effect on EPS due to sensitive receptors - bats, breeding birds, barn owls, water voles, grey crested newts, hazel dormice, otter, reptile, badgers, and invertebrates.	Slight Adverse	
Nationally Designated Sites	Operation	Covered at construction period.	As the SSSI is located over 300m from the scheme and outside the ZoI for air quality effects, no mitigation required. Part of Hazlegrove Park Local Wildlife Site (LWS) is located within the footprint of the scheme. There will be a partial loss (<1%) of the LWS from its periphery to accommodate the new roundabout and access road	Slight Adverse	Slight Adverse
Priority Habitats	Operation	Covered at construction period.	Small scale direct loss of broadleaved woodland, parkland, hedgerows and ditches.	Slight Adverse	
Protected and Notable Species	Operation	Covered at construction period.	Short-term adverse effect whilst the replacement planting establishes.	Slight Adverse reducing to Neutral	
Geology and Soils					
Geology, soils, surface water, groundwater, human receptors, buildings, structures and utilities, and flora	Construction	Best practice mitigation measures to limit impacts during construction to be included within a Construction Environmental Management Plan. Inclusion of a Site Management Plan within the CEMP. Production of appropriate mass balance calculations, a Materials Management Plan, a Site Waste Management Plan and compliance with CL:AIRE document 'The Definition of Waste: Development Industry Code of Practice Version 2 (2011)'. Works to be monitored by a suitably qualified SEE. Any discharge to ground/surface waters need an appropriate Environmental Permit from the EA or a Discharge Consent. Detail GI and Contamination Land Risk Assessment to be undertaken prior to construction. If areas of contamination are identified a Remediation Strategy should be produced.	• 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, such as relating to the discharges of sediment laden groundwaters, entrainment of sediments in surface waters and foundation works increasing turbidity • Encountering contaminated materials within landfills / made ground, mobilisation of contaminants and generation of contaminant transport pathways from site activities • Removal / remediation of any areas of contaminated soils identified (beneficial effect) • Effects on construction workers, relating to contact with, e.g. contaminated materials and landfill gases • Degradation of construction materials such as thaumasite concrete attack • Impairment of landscape and grassland re-development	Slight Adverse	Slight Adverse
Materials					
Material resource use	Construction	Best practice measures for the storage and delivery of materials, minimising the use of virgin materials, the re-use of materials and the use of recycled materials to be included within a CEMP and SWMP. Continue to undertake carbon calculations using the Mott MacDonald Carbon Portal to ensure a low carbon design. Minimise use of virgin materials within the design itself through using the Design for Resource Efficiency tool. Production of an MMP.	Use of large quantities of material resources leading to a depletion of non-renewable resources.	Potentially Significant Adverse	Potentially Significant Adverse
Waste generation	Construction	Best practice measures, such as moving waste as far up the waste hierarchy as possible, storage / handling of waste, to be included within a CEMP. Production of an MMP and SWMP.	Disposal of waste to landfill that cannot be re-used or recycled, which would impact on the remaining landfill capacity of the area.	Not Significant Adverse	
Noise and Vibration					
Noise	Construction	Working hours and level of noise at nearby properties will be agreed by the Contractor in advance, with the Local Authority Environmental Health Officer. Section 61 Application. Best practice measures to be included within a CEMP. Effective communication between the promoter, Contractor and the public, including prior notification of construction works.	Disturbance to dwellings (people) due to noise and vibration from construction activities.	Not Significant Adverse	Not Significant Adverse

Topic	Stage (construction / operation)	Proposed mitigation	Description of potential effect	Likely significance of residual effect after mitigation	Overall likely significance of effect
Noise	Operation	Use of thin surface course.	A greater number of increases than decrease in noise levels at dwellings and sensitive receptors from changes to traffic / flows	Not Significant Adverse	Not Significant Adverse
People and Communities					
Human health and wellbeing effects	Construction	Best practice measures to be included within a CEMP. Clearly signed temporary diversions for NMUs.	• Temporary increase in journey length would benefit health and wellbeing of NMUs • Temporary severance would be detrimental to health and wellbeing	Not Significant Adverse	Slight Adverse
Non-motorised users, amenity, severance, agricultural land, individual farm businesses, demolition of private property, land take, motorised travellers view from the road, driver stress	Construction	Best practice measures to be included within a CEMP. Production of a TMP. Clearly signed temporary diversions for NMUs. Reinstatement measures for impacted agricultural land. Compensation for landowners through the Compulsory Purchase Acquisition mechanism. Management of soils in accordance with Defra's 'Construction Code of Practice for the Sustainable Use of Soils on Construction Sites' (2009) and a SMP.	• Temporary increase in journey length and time for NMUs • Existing barriers between people and traffic would change which would affect amenity • NMU routes connecting to community facilities would experience adverse effects to journey time and quality • Potential for agricultural land take • Potential for land take of individual farm businesses; Temporary presence of Traffic Management would cause increase in driver frustration and fear of accidents	Slight Adverse	
Human health and wellbeing effects	Operation	Appropriate NMU Strategy.	• Permanent changes to journey length, severance and amenity would impact on health and wellbeing.	Not Significant Adverse	Neutral
Non-motorised users, amenity, severance, agricultural land, individual farm businesses, demolition of private property, land take, motorised travellers view from the road, driver stress	Operation	Appropriate NMU Strategy. Provision of replacement agricultural land. Replacement of access points to farms. Compensation for landowners through the Compulsory Purchase Acquisition mechanism.	• Permanent changes to journey length for NMU • Provision of new NMU facilities or degradation of existing NMU facilities • Amenity would be affected through changes to barriers between people and traffic, changes in flows, and provision of new facilities • NMU routes connecting to community facilities would experience adverse effects to journey time and quality • Land take required of agricultural land of Grade 3 • Land take of individual farm businesses required • Demolition of a small number of assumed derelict buildings required • Land take of areas of parking or private land • New views for vehicle travellers • Vehicle travellers would be able to drive along the road at a more consistent speed and improved journey time reliability	Neutral	
Road Drainage and the Water Environment					
Surface water and groundwater	Construction	• Best practice measures for pollution prevention and water management to be included in a CEMP. • Compliance with CIRIA Guidance. • GI prior to construction and remediation or capping of known contaminated areas. • Consideration of biological and hydromorphological condition of the drainage ditches during the detailed design stage. • Dewatering minimised where practicable through design reducing the requirement for deep excavations. • Below ground structures minimised where practicable during detailed design stage. • Selection of best timing for temporary below ground structure utilisation in relation to the seasonal variation of groundwater level.	• Pollution from suspended sediment/contaminated runoff; • Pollution from chemical spillages/leaks and water runoff; • Disturbance of contaminated ground causing pollution; • Discharge of dewatering; • Physical impact from new/upgraded outfall; • Dewatering affecting groundwater levels; and, • Changes to groundwater level/flow.	Residual effects reported as Neutral within the Environemntal Impact Assessment Scoping Report (November 2017).	Residual effects reported as Neutral within the Environemntal Impact Assessment Scoping Report (November 2017). As such, this chapter has been scoped out of the Environmental Statement.
Surface water, groundwater, and floodplain	Operation	• SuDS and pollution control measures would be incorporated within the design. • Design will be in accordance with Environmental Agency guidance. • Loss of waterbody due to infilling minimised where practicable during detailed design. • Creation of new drainage ditches/ponds. • Consideration of groundwater level/flow during detailed design. • Piling minimised where practicable during detailed design. • Drainage design to ensure no increase in runoff rates in accordance with the NNPF and NPSNN.	• Contaminants within surface water runoff due to traffic. • Physical impact from new/upgraded outfall. • Physical impact to drainage ditches from waterbody infilled due to presence of embankment. • Changes to groundwater level/flow. • Physical impact/creation of preferential pathway from piling to groundwater. • Increased surface water runoff from the scheme.	Residual effects reported as Neutral within the Environemntal Impact Assessment Scoping Report (November 2017).	Residual effects reported as Neutral within the Environemntal Impact Assessment Scoping Report (November 2017). As such, this chapter has been scoped out of the Environmental Statement.
Climate					
Effects on climate	Construction	The scheme design aims to reduce the overall footprint of the scheme by re-using the existing A303 where practicable. The footprint of structures and junctions will be made as compact where practicable, ensuring minimal land use change and materials use. Throughout the scheme design, materials will be evaluated and their carbon emissions calculated.	• The carbon assessment has indicated that the scheme would release approximately 19,082 tCO2e	Further assessment required as part of the ES to determine significance of effect.	Further assessment required as part of the ES to determine significance of effect.
Vulnerability to climate	Construction	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.	It is not expected that climate change would result in a change in the risk of severe weather by the end of 2.5 year construction period, although the construction site may be vulnerable to extremes of weather, leading to the risk of delay in activities.	Anticipated to be Neutral, with no further assessment required as part of the ES.	Anticipated to be Neutral, with no further assessment required as part of the ES.
Effects on climate	Operation	Not applicable	The scheme would produce emissions due to traffic and through maintenance.	Anticipated to be Neutral, although further assessment required as part of the ES.	Anticipated to be Neutral, although further assessment required as part of the ES.
Vulnerability to climate	Operation	Different mitigation factors are available for each of the potential effects e.g. Consider foundations incorporating hydraulically bound materials or the use of reinforcement such as geotextiles.	There is the potential for various effects to occur. Pavements have a typical design life of 40 years and would therefore be affected by changes in climate. Increases in winter	Further assessment required as part of the ES as potential for scheme	Further assessment required as part of the ES as potential for scheme

Topic	Stage (construction / operation)	Proposed mitigation	Description of potential effect	Likely significance of residual effect after mitigation	Overall likely significance of effect
			precipitation could result in increased sub-surface moisture content, decreasing foundation strength. Increases in summer temperature have the potential to result in increased risk of surface failure, warping of slabs, excessive movement at joints and difficulty in maintaining asphalt surface profile during compaction.	assets and environmental receptors to be affected by changes in climate.	assets and environmental receptors to be affected by changes in climate.
Combined and Cumulative Effects					
Combined	Construction	Not applicable.	Potential for impact interactions associated with the scheme upon separate environmental receptors.	Not Significant Adverse	Not Significant Adverse
Combined	Operation	Not applicable.	Potential for impact interactions associated with the scheme upon separate environmental receptors.	Not Significant Adverse	Not Significant Adverse
Cumulative	Construction	Not applicable.	Potential for incremental changes to be caused by other potential major future developments together with the scheme.	Not Significant Adverse	Not Significant Adverse
	Operation	Not applicable.	Potential for incremental changes to be caused by other potential major future developments together with the scheme.	Not Significant Adverse	Not Significant Adverse

17 Glossary

Glossary Term	Descriptive Definition
Agricultural Land Classification	Agricultural Land Classification provides a means of assessing the quality of farmland. Its assessment is based on physical limitations of the land, such as climate, site characteristics (e.g. gradient) and soil. The assessment gives an indication of the versatility and expected yield of the land. The system classifies agricultural land in 5 grades. The best and most versatile land is classified as 1, 2 and 3a. The Agricultural Land Classification was developed by the former Ministry of Agriculture, Fisheries and Food (MAFF) in 1988 and revised in 1996.
Air Quality Management Area (AQMA)	Any parts of a Local Authority's area where the air quality objectives are not being achieved, or are not likely to be achieved within the relevant period must be identified and declared an AQMA.
Air Quality strategy (AQS)	Establishes the UK framework for air quality improvements. The Environment Agency is required to have regard to the Strategy in exercising its pollution control functions. Local authorities are also required to work towards the Strategy's objectives prescribed in regulations for that purpose.
Air quality objectives	Objectives are policy targets often expressed as a maximum ambient concentration not to be exceeded, either without exception or with a permitted number of exceedances, within a specified timescale.
Ambient Noise	Ambient noise is the total sound in a given situation at a given time usually composed of sound from many sources, near and far.
Baseline conditions	The environment as it appears (or would appear) immediately prior to the implementation of the project together with any known or foreseeable future changes that will take place before completion of the project.
Birds Directive	EC Directive on the Conservation of Wild Birds (Birds Directive 1979) as amended (79/409/EEC).
Biodiversity	The biological diversity of the earth's living resources. The total range of variability among systems and organisms at the following levels of organisation: bioregional, landscape, ecosystem, habitat, communities, species, populations, individuals, genes and the structural and functional relationships within and between these different levels.
Biodiversity Action Plan (BAP)	It describes the biological resources of the UK and provides detail plans for conservation of these resources.
Conservation Area	An area designated by the Local Planning Authority under the Town and Country Planning (Listed Buildings and Conservation Areas) Act 1990 as possessing special architectural or historical interest. The Local Planning Authority will seek to preserve and enhance the character and appearance of these areas.
Congestion	Traffic experiences periods of excessive breaking and acceleration and is associated with higher vehicle emissions. On motorways this occurs at speeds less than 50mph and / or near complex junctions.
Contamination Land Risk Assessment (CLRA)	It covers the main hazards that might happen during the construction project and the risk management that is required.
Conservation Area	An area designated by the Local Planning Authority under the Town and Country Planning (Listed Buildings and Conservation Areas) Act 1990 as possessing special architectural or historical interest. The Local Planning Authority will seek to preserve and enhance the character and appearance of these areas.
Conservation Management Plan	A conservation management plan is a document that sets out the significance of a heritage asset, and how the significance will be retained in any future use, management, alteration, or repair.
Construction Environmental Management Plan (CEMP)	A CEMP includes the specific measures that will be taken to control and manage the environmental impacts whilst the project is under construction that may otherwise occur for each of the environmental topics, such as noise, air quality, water resources and ecology. In addition, a description of the planned works and the general site arrangements should be included in the CEMP. The Principal Contractor will be responsible for ensuring the measures specified within the CEMP are implemented.
Cultural heritage landscape	The combination of nature and humankind, they express long relationship between people and their natural environment. Certain sites reflect techniques of land use that guarantee and sustain biological diversity.
Cumulative Assessment	An assessment on how the effects of the proposed scheme would combine and interact with the effects of other developments. It considers the accumulation of, and interrelationship between effects which might affect the environment, economy or community as a whole, even though they may be acceptable when considered on an individual basis with mitigation measures in place.
Decibel (dB)	The decibel is a logarithmic unit that expresses the ratio of 2 values of a physical quantity, often power or intensity. One of these quantities is often a reference value and in this case the decibel expresses the absolute level of the physical quantity.

Glossary Term	Descriptive Definition
Design Manual for Roads and Bridges (DMRB)	Design Manual for Roads and Bridges is a set of documents published by Highways England. The document provides a comprehensive manual system which accommodates all current standards, advice notes and other published documents relating to the design, assessment and operation of trunk roads (including motorways).
Design Year	15years after the Opening Year.
Development Consent Order (DCO)	Development Consent Order is a combination of grant planning permission with a range of other separate consents such as listed buildings. It can also include rights to compulsorily purchase land.
Do-Minimum network scheme	The Do Minimum forecast scenario in the Opening / Design Year is the base road and traffic network against which alternative improvements can be assessed. In many cases, the definition of the Do Minimum is straightforward; it is simply the Do Nothing scenario. However, 1 or more of the following 4 cases may arise, in which the Do Minimum differs from the Do Nothing: i) The case where works will be carried out regardless of whether or not the Do Something scheme is built. ii) The case where the existing network may be improved to form a Do Minimum scheme which can be tested as an alternative to carrying out major Do Something improvements. iii) The case where traffic conditions can be improved without significant capital expenditure. iv) The case where the area covered by the modelled network includes road proposals other than the one under immediate consideration.
Driver Stress	The adverse mental and physiological effects experienced by a driver traversing a road network
Effect	Term used to express the consequence of an impact (expressed as the significance of effect), which is determined by correlating the magnitude of the impact to the importance, or sensitivity, of the receptor or resource in accordance with defined significance criteria. For example, land clearing during construction results in habitat loss (impact), the effect of which is the significance of the habitat loss on the ecological resource.
Emissions	Mass of a pollutant per time per vehicle at the point of exhaust and are used as inputs into an air quality model.
Enhancement	A measure that is over and above what is required to mitigate the adverse effects of a project.
Environment Agency	The Environment Agency is responsible for environmental protection and regulation in England and plays a central role in implementing the government's environmental strategy. The Environment Agency is the main body responsible for managing the regulation of major industry and waste, treatment of contaminated land, water quality and resources, fisheries, inland river, estuary and harbour navigations, and conservation and ecology. They are also responsible for managing the risk of flooding from main rivers, reservoirs, estuaries and the sea.
Environmental Management Plan (EMP)	An EMP provides the framework for recording environmental risks, commitments and other environmental constraints and clearly identifies the structures and processes that will be used to manage and control these aspects. The EMP also seeks to ensure compliance with relevant environmental legislation, government policy objectives and scheme specific environmental objectives. It also provides the mechanism for monitoring, reviewing and auditing environmental performance and compliance.
Farm / Individual farm holdings / Farm business	An area of land that consists of 1 or more land parcels or group of fields that are managed by a named person or named business entity as an owner, tenant or in any other commercial agricultural capacity, for the production of food, forage or fibre.
Flood Risk Assessment	An assessment of the likelihood of flooding in a particular area so that development needs and mitigation measures can be carefully considered.
Forecast (Traffic)	A model describing a future set of traffic conditions e.g. Do Minimum, Do Something, etc.
Grade-separated junction	A grade-separated junction is a junction where the conflicting traffic flows are kept apart, usually by means of a bridge or tunnel.
Habitat Directive	EC Directive on the Conservation of Natural Habitats and of Wild Flora and Fauna (Habitats Directive 1982) as amended (92/43/EEC).
Heart of the South West (HotSW)	This is a LEP (refer to LEP in the glossary). The purpose of economic growth, job creation and prosperity in the areas of Devon, Plymouth, Somerset and Torbay.
Habitat Suitability Index (HSI)	A numerical index where a score of 0 and 1.0 are recorded for each habitat value which can include: geographic location, water quality and permanence.
Handover Environmental Management Plan (HEMP)	This is the main vehicle for passing essential environmental information to the client and responsible for future maintenance and operation of the asset.
Historic England	The public body that looks after England's historic environment. Championing historic places and helping people understand their value and care for them.

Glossary Term	Descriptive Definition
Historic Environment	All aspects of the environment resulting from the interaction between people and places through time, including all surviving physical remains of past human activity, whether visible, buried or submerged, and landscaped and planted or managed flora.
Impact	Change that is caused by an action; for example, land clearing (action) during construction which results in habitat loss (impact).
Highways England Interim Advice Note (IAN)	These contain specific guidance which are only used in connection with works on motorways and trunk roads.
Heavy Goods Vehicle (HGV)	HGVs are vehicles over 3.5 tonnes and includes rigid and articulate lorries.
$L_{Aeq, T}$ Index	The equivalent continuous level $L_{Aeq, T}$ is the level of a notional steady A-weighted sound, which at a given position and over a defined period of time (T) would have the same A-weighted acoustic energy as the fluctuating noise.
L_{Amax} Index	The maximum A-weighted sound pressure level measured during a given time period.
Listed Buildings	A building which is considered by the Secretary of State (for Culture, Media and Sport) to be of special architectural or historic interest in accordance with the regime set out in the Town and Country Planning (Listed Buildings and Conservation Areas) Act 1990.
Local Enterprise Partnership (LEP)	The LEP is a partnership between private sector, local authorities, universities and colleges.
Light Goods Vehicle (LGV)	LGVs are vehicles under 3.5 tonnes and refers to a commercial carrier.
Lidar	It is a remote sensing technique that uses laser light to densely sample the surface of the earth, producing x,y,z measurements.
Materials Management Plan (MMP)	An MMP manages the recovery of material from the waste stream as opposed to producing new materials/it also reduces the amount of waste and recyclables delivered to disposal or resource recovery facilities.
Mitigation	Measures intended to avoid, reduce and, where practicable, remedy significant adverse environmental effects.
National Character Areas (NCAs)	A natural sub division of England based on a combination of landscape, biodiversity, geodiversity and economic activity. The NCAs are defined by Natural England, the UK government's advisors on the natural environment.
Natural Environment and Rural Communities (NERC)	The aim of the NERC is to ensure the natural environment is conserved, enhanced and managed for the present and future generations.
National Planning Policy Framework (NPPF)	The NPPF sets out the Government's planning policies for England.
National Policy Statements	National policy statements are instruments issued under section 52(2) of the Resource Management Act 1991 and state objectives and policies for matters of national significance.
National vegetation classification (NVC)	The NVC assesses the full suite of vascular plant, bryophyte and macro-lichen species with a certain vegetation type.
Natural England	Natural England are responsible for: • Helping land managers and farmers protect wildlife and landscapes • Advising on the protection of the marine environment in inshore waters (0 to 12 nautical miles) • Improving public access to the coastline • Managing 140 National Nature Reserves and supporting National Trails • Providing planning advice and wildlife licences through the planning system • Managing programmes that help restore or recreate wildlife habitats • Conserving and enhancing the landscape • Providing evidence to help make decisions affecting the natural environment
Lowest Observed Adverse Effect Level (LOAEL)	This the level of noise above which adverse effects on health and quality of life can be detected.
NO_x	Oxides of Nitrogen – which encompasses all nitrogen species although mainly NO and NO_2.
NO_2	Nitrogen Dioxide.
Opening Year	The estimated year that the scheme would become operational.
Operation	The functioning of a project on completion of construction.
Outline Construction Environmental Management Plan	A CEMP at outline stage which will later be refined and expanded into a full CEMP as more information becomes available and there is more certainty in terms of the proposed layout, construction methods, programme, and the likely environmental effects.
Peak Particle Velocity (PPV)	Peak particle velocity refers to the maximum speed of a particular particle as it oscillates about a point of equilibrium that is moved by a passing wave. It is a term used to describe vibration, or elastic movement, resulting from excitation by seismic energy as it passes a particular point.

Glossary Term	Descriptive Definition
Planning Inspectorate (PINS)	The Planning Inspectorate deals with planning appeals, national infrastructure planning applications, examinations of local plans and other planning-related and specialist casework in England and Wales.
PM_{10}	Particulate matter with a diameter of 10 microns or less.
Project Control Framework	Project Control Framework supports the implementation of project management within an organisation because: 1. It supports the development and replication of accepted practice 2. Helps communication within the team because of a common language 3. Streamlines the use of tools and techniques for key project management processes 4. Establishes a consistent approach which aid customers understand the project management processes 5. 5. Ensure that focus is maintained on the early stage of the project lifecycle
Receptor	A defined individual environmental feature that has the potential to be affected by a project.
Registered Park and Garden	A park or garden that has been registered under Historic England's 'Register of Historic Parks and Gardens of special historic interest in England' due to its high level of historic interest.
Scheduled Monument	A historic building or site that is included in the schedule of monuments kept by the secretary of state for culture, media, and sport. The National Planning Policy Framework sets out the Government's planning policies for England.
Significant Observed Adverse Effect Level (SOAEL)	This is the level of noise above which significant adverse effects on health and quality of life occur.
Site of Special Scientific Interest (SSSI)	A SSSI is a conservation designation denoting a protected area in the United Kingdom, designated due to special interest in its flora, fauna, geological or physiographical features. They are protected by law to conserve their wildlife or geology.
Strategic Road Networks (SRN)	A strategic road network is made up of motorways and major trunk roads in England and that are managed by Highways England.
Site Waste Management Plan (SWMP)	SWMPs encourage the effective management of materials and ensure waste is considered at all stages of a project - from design through to completion. Although no longer a regulatory requirement in England, SWMPs are still considered to be good practice.
Transport analysis guidance	Transport analysis guidance is a document produced by the government for projects that require government approval. It provides guidance on a range of topics which include: creating a transport model for the appraisal of the alternative solutions.
Transport appraisal process/ WebTAG	WebTAG involves a 3 stage process: Stage 1 – option development, identifying the need for intervention and developing options Stage 2 – further appraisal – the focus of the analysis is on estimating the likely performance and impact of intervention(s) in detail Stage 3 – implementation, monitoring and evaluation
TRICS	An interactive database and data analysis system comprising large number of transport survey records of individual developments across land use categories.
Unexploded ordnance (UXO)	Unexploded ordnance are explosive weapons (bombs, bullets etc) that did not explode when employed and still pose a risk of detonation. When planning a civil engineering project, a UXO assessment is done to determine whether any potential risks may be present.

Appendices

Appendix A: Proposed scheme and environmental constraints plan

Appendix A.1 – Proposed scheme and environmental constraints plan

RIVER CARY - SOURCE TO CONFLUENCE WITH KING SEDGEMOOR DRAIN (KSD)
DYKE BROOK
CELTIC WAY
STEART HILL
MEAD LANE (TRACK)
STEART HILL
CELTIC WAY
A303
SPARKFORD
HIGH STREET
RIVER CAM - UPPER
DOWNHEAD LANE (TRACK)
CAMEL HILL
EASTMEAD LANE (TRACK)
DOWNHEAD
WEST CAMEL HILL
A303
GASON LANE
A359
TRAITS LANE
SPARKFORD HILL
CELTIC WAY
HOWELL HILL
A303
PODIMORE
B3151
RIVER CAM - LOWER
LELAND TRAIL
WEST CAMEL
QUEEN CAMEL
LELAND TRAIL
PARSONAGE ROAD
LELAND TRAIL
ROYAL NAVAL AIR STATION, YEOVILTON

Target Notes:

1. ST PETERS CHURCH
2. THE PODYMORE INN PUBLIC HOUSE
3. MEDIEVAL SETTLEMENT REMAINS 100M AND 250M NORTH OF DOWNHEAD MANOR FARM SCHEDULED MONUMENT
4. MILESTONE ON A303 AT NGR ST57892538 (GRADE II) LISTED BUILDING
5. WEST CAMEL METHODIST CHURCH
6. WEST CAMEL CONSERVATION AREA
7. ROMANO-BRITISH SETTLEMENT IMMEDIATELY SOUTH WEST OF CAMEL HILL FARM SCHEDULED MONUMENT
8. CAMEL HILL TRANSMITTER SITE LWS
9. GASON LANE FIELD LWS
10. CAMEL HILL QUARRY EAST LGS
11. RIDGE COPSE LWS
12. CAMEL HILL QUARRY HISTORIC LANDFILL
13. SPARKFORD HILL COPSE LWS AND LGS
14. QUEEN CAMEL CONSERVATION AREA
15. HAZLEGROVE HOUSE (GRADE II LISTED) REGISTERED PARK AND GARDEN
16. HAZLEGROVE PARK LWS
17. LAND ADJACENT TO HAZLEGROVE PARK HISTORIC LANDFILL
18. SPARKFORD INN PUBLIC HOUSE
19. SPARKFORD CRICKET CLUB
20. SPARKFORD WOOD SSSI

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Key to Symbols:

- DRAFT RED LINE BOUNDARY
- NAMED WALKING ROUTES
- FOOTPATH ALONGSIDE CARRIAGEWAY
- FOOTPATH
- BRIDLEWAY
- RESTRICTED BYWAY
- CYCLE ROUTE
- FOSSE WAY
- REGISTERED PARK ND GARDEN
- HISTORIC LANDFILL
- PONDS, LAKES AND RUNNING WATER
- LISTED BUILDING
- ANCIENT WOODLAND
- NOISE IMPORTANT AREA
- SITES OF SPECIAL SCIENTIFIC INTEREST (SSSI)
- CONSERVATION AREA
- SCHEDULED MONUMENT
- LOCAL GEOLOGICAL SITE (LGS)
- FLOOD ZONE 2
- FLOOD ZONE 3
- LOCAL WILDLIFE SITE (LWS) (SOMERSET ENVIRONMENTAL RECORDS CENTRE, JUNE 2017)
- NATIONAL TRUST LAND
- CANDIDATE LOCAL WILDLIFE SITE (SOMERSET ENVIRONMENTAL RECORDS CENTRE, JUNE 2017)
- REGISTERED COMMON LAND
- ANCIENT WOODLAND IDENTIFIED BY SOMERSET ENVIRONMENTAL RECORDS CENTRE
- PROPOSED DEVELOPMENTS IDENTIFIED IN THE SOMERSET DISTRICT COUNCIL HOUSING AND ECONOMIC LAND AVAILABILITY ASSESSMENT

Project Title:
A303 SPARKFORD TO ILCHESTER DUALLING

Drawing Title:
ENVIRONMENTAL CONSTRAINTS PLAN

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Appendix A.2 – Proposed red line boundary and scheme elements

SPARKFORD

CAMEL HILL

STEART HILL

A303

A359

DOWNHEAD

SPARKFORD HILL

PODIMORE

WEST CAMEL

QUEEN CAMEL

B3151

ROYAL NAVAL AIR STATION, YEOVILTON

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Key to Symbols:

- PROPOSED SIGNAGE
- ROUTE CENTRELINE
- PROVISIONAL RED LINE BOUNDARY
- LAND TO BE PERMANENTLY ACQURED FOR CONSTRUCTION AND OPERATION
- LAND TO BE USED TEMPORARILY DURING CONSTRUCTION AND RIGHTS TO BE ACQUIRED PERMANENTLY FOR MAINTENANCE ACCESS DURING OPERATION
- LAND TO BE USED TEMPORARILY DURING CONSTRUCTION
- PROPOSED ECOLOGICAL MITIGATION AREAS DURING OPERATION
- EXISTING A303 TO BE DETRUNKED DURING OPERATION

Scale @ A1:

1:10,000 — 0 — 500m — 1000m

Project Title:

A303 SPARKFORD TO ILCHESTER DUALLING

Drawing Title:

PROPOSED RED LINE BOUNDARY AND SCHEME ELEMENTS

C:\pwlocal\pwise_cde_he\har75752\dms16486\HE551507-MMSJV-EGN-000-DR-LP-0010.dwg Jan 23, 2018 - 2:25PM har75752

Appendix B: Air quality

Appendix B.1 – Methodology

17.1.1 The air quality assessment has been completed in accordance with Local Air Quality Management Technical Guidance (TG16)[172] and Volume 11, Section 3, Part 1 of DMRB HA207/07 and in line with the following IANs:

- IAN 170/12 'Updated air quality advice on the assessment of Future NO_x and NO_2 projections for users of DMRB Volume 11, Section 3, Part 1, Air Quality'
- IAN 174/13 'Updated advice for evaluating significant local air quality effects for users of DMRB Volume 11, Section 3, Part 1 Air Quality';
- IAN 175/13 'Updated advice on risk assessment related to compliance with the EU Directive on ambient air quality and on the production of scheme Air Quality Action Plans for users of DMRB Volume 11, Section 3, Part 1 Air Quality (HA207/07)'
- IAN 185/15 'Updated traffic, air quality and noise advice on the assessment of traffic data into speed-bands for users of DMRB Volume 11, Section 3 Part 1 Air Quality'

17.1.2 Potential construction dust effects were considered in accordance with DMRB HA207/07, which involves identifying sensitive receptors within 200metres of the construction site. The drawing contained within appendix B.3 shows the sensitive receptors identified for the construction phase of the scheme.

17.1.3 Operational air quality effects were considered in accordance with the guidance above as well as Defra's Local Air Quality Management Technical Guidance (TG16). The methodology is outlined in more detail below.

17.1.4 It should be noted that PM_{10} was not considered within the local air quality assessment. Background concentrations provided by Defra show that background PM_{10} concentrations are well below the AQO in the study area. Additionally, South Somerset District Council previously monitored and reviewed concentrations of PM_{10} in the district, which did not result in the declaration of any AQMAs for this pollutant. Therefore, it is expected that PM_{10} concentrations at receptors in the vicinity of the scheme will not exceed the relevant AQOs. Furthermore, vehicles emission factors for PM_{10} are relatively low and at least an order of magnitude lower than for NO_x. It is therefore considered unlikely that the impact of the scheme on PM_{10} would be sufficient to lead to exceedances of PM_{10} AQOs or limit values, and as such PM_{10} impacts were not been considered further within the local assessment, although this will be reviewed and confirmed as part of the Environmental Statement.

Screening method

17.1.5 An operational local and regional air quality assessment has been undertaken using Highways England's DMRB Screening Method Version 5 which incorporates IAN 185/15 speed band emissions from the Emission Factor Toolkit v7.0. The Screening Method uses link traffic inputs, road width and the

[172] 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 January 2018).

distance between the road and receptor to predict concentrations and total emissions of NO_x, PM_{10} and CO_2 at a local and regional scale.

Assessment scenarios

Local assessment

17.1.6 The following scenarios have been considered in the assessment for local air quality:

- Base Year / Model Verification Year 2016
- Do Minimum (without proposed scheme) 2023 Opening Year
- Do Something (with proposed scheme) 2023 Opening Year

17.1.7 Base year air quality predictions were used to verify the model against air quality monitoring data (as described in appendix B.2). A model verification year of 2016 was used as this is the year that scheme-specific monitoring was undertaken on behalf of Highways England. Following consultation with the scheme's traffic modelling team, it was considered acceptable to directly compare the 2015 base year traffic against 2016 monitored ambient NO_2 concentrations as the traffic flows for 2015 are representative of flows in 2016 (i.e. there is a negligible change in traffic characteristic on the network between 2015 and 2016).

17.1.8 Pollutant concentrations predicted in the Opening Year Do Minimum and Do Something scenario of the scheme were compared to ascertain the effect of the scheme on local air quality. It should be noted that an assessment of Opening Year air quality effects is expected to provide a worst-case assessment, as air quality is expected to improve in future years as a result of improvements in vehicle emissions and background air quality.

Regional assessment

17.1.9 The following scenarios have been considered in the assessment for regional air quality:

- Do Minimum (without scheme) 2023 Opening Year;
- Do Something (with scheme) 2023 Opening Year;
- Do Minimum (without scheme) 2038 Design Year; and,
- Do Something (with scheme) 2038 Design Year.

17.1.10 Emissions were estimated using speed band emission factors and link lengths from the traffic model. It should be noted that speed band emission factors are not available beyond 2030. Emission factors representative of 2030 have therefore been used to represent emissions in 2038 for the design year scenarios.

Traffic data

17.1.11 Outputs from the South West Regional SATURN traffic model (SWRTM) developed to assess the traffic impacts for the scheme were used in the

assessment. Data on vehicle flow, speed and percentage of Heavy Duty Vehicles (HDVs - the sum of Heavy Goods Vehicles and buses) were available for the following periods in the base, Do-Minimum and Do-Something scenarios for the scheme:

- AM peak period (07:00 to 10:00)
- Inter peak period (10:00 to 16:00)
- PM peak period (16:00 to 19:00)
- Off peak period (19:00 to 07:00)

17.1.12 The diurnal traffic flow characteristics, and therefore emissions, were represented in the DMRB Screening Method. The same profile used for weekdays was applied to the weekend.

17.1.13 Speed data has also been derived from the SWRTM and was Speed Banded following application of derived speed pivots in accordance with IAN 185/15.

Background pollutants

17.1.14 Total air pollutant concentrations comprise a background and local component. Background concentrations are determined by regional, national and international emissions, and often represents a significant proportion of the total pollutant concentration. The local component is determined by local pollutant sources such as roads, and in this case, was considered using the DMRB Screening Method.

17.1.15 Background pollutant concentrations are spatially and temporally variable throughout the UK. Annual mean background concentrations of NO_x, NO_2 and PM_{10} were obtained from Defra's Air Information Resource (AIR) website[173]. The Defra maps provide yearly forecasts based on a grid at a resolution of $1km^2$ across the whole of the UK.

17.1.16 The background NO_x and NO_2 concentrations from the Defra maps were compared against Defra's Automatic Urban and Rural Network (AURN) rural background automatic measurements from Charlton Mackrell. This is presented below in Table B.1.

17.1.17 Defra background concentrations are lower than the monitored background concentrations at Charlton Mackrell. Background concentrations are relatively low across the study area and small differences in absolute concentrations between the Defra backgrounds and the monitored data can affect predicted results. Therefore, the Defra NO_x and NO_2 background concentrations applied to the assessment were uplifted by a factor of 1.12 and 1.15 respectively, to improve the agreement with concentrations monitored at the AURN site.

[173] Defra (2018) UK-AIR Information Resource [online] available at: https://uk-air.defra.gov.uk/ (last accessed January 2018)

Table B.1: Comparison of monitored background NO_2 concentrations and Defra background pollutant map data

Data source	2016		
	NO_2 Concentration ($\mu g/m^3$)	NO_x Concentration ($\mu g/m^3$)	Annual Data Capture (%)
Charlton Mackrell (Defra AURN monitoring)[(a)]	7.4	9.4	99%
Defra Background at Charlton Mackrell[(b)]	6.4	8.4	-

Notes: [(a)] – Located at 352196,128768.
[(b)] – Grid square 352500,128500.

17.1.18 It is possible to adjust the Defra background maps to remove sources modelled explicitly, and so avoid double counting. No sources were removed from the Defra maps used in the assessment, as the air quality screening predictions only include road sources within 200 metres of a receptor, and so do not consider the full contribution of these sources included in the Defra 1 by 1 kilometre background concentrations.

17.1.19 The range of Defra backgrounds applied to sensitive receptors have been presented in Table B.2. These background values were uplifted by a factor of 1.12 (NO_x) and 1.15 (NO_2), as discussed above. Further details of the Defra backgrounds used within model verification can be found in appendix B.2.

Table B.2: Adjusted Defra background pollutant map data for the Local Assessment

Location (Easting, Northing)	2015		2023	
	NO_x ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	NO_x ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)
357500, 125500	11.0	8.6	7.7	6.1
357500, 125500	11.0	8.6	7.7	6.1
357500, 125500	11.0	8.6	7.7	6.1
358500, 125500	11.1	8.7	7.8	6.1
356500, 125500	9.8	7.7	7.1	5.6
367500, 127500	10.8	8.4	7.6	6.1
383500, 132500	10.9	8.5	7.8	6.1
397500, 135500	11.6	9.0	8.2	6.5
348500, 119500	12.9	10.0	8.7	6.9
346500, 117500	11.3	8.8	7.7	6.1
357500, 125500	11.0	8.6	7.7	6.1
359500, 125500	12.0	9.3	8.3	6.6
358500, 126500	9.5	7.4	6.9	5.5
383500, 132500	10.9	8.5	7.8	6.1
397500, 135500	11.6	9.0	8.2	6.5
381500, 133500	10.2	7.9	7.4	5.9
403500, 140500	11.3	8.7	8.1	6.4
405500, 140500	12.1	9.4	8.4	6.6

Note: Background concentrations have been uplifted by a factor of 1.12 (NOx) and 1.15 (NO_2) and have not been sector removed.

NO_x to NO_2 relationship

17.1.20 Emission rates used within the DMRB Screening Method use NO_x to represent all nitrogen-oxygen species emitted in vehicle exhaust gases. The proportion of NO_2 is needed for comparison with the AQOs presented in Table 5.1.

17.1.21 Research undertaken on behalf of Defra has provided a spreadsheet based method which is available from Defra's AIR website for calculating annual mean NO_x to NO_2 conversions. Modelled road-traffic NO_x was converted to NO_2 using Version 5.1 of the calculator.

Future NO_x to NO_2 projections

17.1.22 The Defra background pollution maps and vehicle emission factors assume that air quality improves in future years, as older vehicles are replaced with modern cleaner vehicles. However, in general, UK monitored roadside NO_2 concentrations have not declined as would be expected in recent years. This trend is thought to be related to the increased use of modern diesel vehicles, which emit more NO_x than expected under urban driving conditions and have higher primary NO_2 emissions than petrol vehicles.

17.1.23 The 2016 Defra air quality tools were used in the assessment. However, it is still considered that future NO_2 concentrations are likely to be underestimated in some areas when using the 2016 tools. A long-term trend (LTT) gap analysis was therefore been carried out for NO_2 in accordance with IAN 170/12.

17.1.24 The LTT provides a method to adjust future air quality predictions in line with the observed LTT in roadside NO_2 in the UK. The baseline air quality data presented in Section 5.5, suggests that NO_2 concentrations in the study area have not declined as would be expected in recent years. A LTT gap analysis was therefore carried out for annual mean NO_2 in this assessment, in accordance with IAN 170/12 as future concentrations predicted using LTT gap analysis will be closer to observed local trends than those predicted using Defra tools.

17.1.25 IAN 170/12 describes three potential approaches to forecast NO_x and NO_2 in future years. Professional judgement is required to determine the most appropriate approach:

- Defra's technical guidance
- Interim LTT_{E6} projections
- LTT projections

17.1.26 For the assessment, the interim LTTE6 gap analysis calculator was used, which accounts for the anticipated emission improvements from Euro 6/VI vehicles (which started entering the UK fleet from 2014). Data is still being gathered on the emission performance of Euro 6/IV vehicles under real world driving conditions, but to date, the information suggests that these vehicles emit less pollution than earlier Euro standards. The air quality effects presented here can therefore be considered as realistic / worst-case, and form a robust approach to considering the risk of any potential significant air quality effects arising during the operation of the scheme.

Predicted 1 Hour NO_2

17.1.27 Annual mean NO_2 concentrations have been presented for identified worst affected receptors. According to Defra guidance, the hourly NO_2 air quality

objective of 200µg/m^3 (not to be exceeded more than 18 times per year) is unlikely to be exceeded at roadside locations where the annual mean concentration is less than 60µg/m^3. Therefore, exceedances of 60µg/m^3 as an annual mean are used as an indicator of potential exceedances of the 1-hour mean NO_2 objective.

Assessment of ecological designated sites

17.1.28 Elevated NO_x concentrations can adversely affect ecosystems, including Special Areas of Conservation (SAC); Special Protection Areas (SPA); Sites of Special Scientific Interest (SSSI) and Ramsar sites (hereafter referred to as 'Designated Sites'). An assessment of scheme effects on Designated Sites was undertaken using the key stages (following the DMRB methodology):

- Identification of all Designated Sites within 200 metres of roads 'affected' by the proposed scheme which have designated features sensitive to air pollutants directly or indirectly; and,
- Calculation of annual average NO_x concentrations at the Designated Sites in the Do-Minimum and Do-Something scenarios.

17.1.29 IAN 174/13 requires that where Designated Sites exceed the annual mean NO_x objective of 30µg/m^3 and changes in NO_x concentrations are greater than 0.4µg/m^3, then nutrient nitrogen deposition should also be calculated and used to determine the overall significance of the scheme effect.

Receptors – human health and wellbeing

17.1.30 Pollutant concentrations were predicted at sensitive receptors, defined according to Defra as:

17.1.31 *'Locations where members of the public are likely to be regularly present and are likely to be exposed for a period of time appropriate to the averaging period of the relevant air quality objective'.*

17.1.32 A selection of 11 sensitive receptors were identified within 200 metres of the affected roads in the study area, as shown in Table B.3 below and the drawing contained in Appendix B.4. Receptors were selected using professional judgement to determine where the highest pollutant concentrations would be likely to arise, and where the greatest effects would be expected to occur due to the proposed scheme.

Table B.3: Sensitive receptors

Receptor ID	Receptor	OS Grid Reference	
		X	Y
1	The Hollies (Plowage Lane/A303)	357084	125028
2	Crusty Cottage (A303)	357668	125298
3	The Firs (Steart Road/A303)	357827	125398
4	Pepperhill Cottage (Camel Hill)	358964	125601
5	Downhead Lane	356541	125788
6	Spring Lodge (A303)	367667	127059
7	Halfway House (A303)	348489	119343
8	Foss Way	346609	117711

Receptor ID	Receptor	OS Grid Reference	
		X	Y
9	Plowage Lane	357118	125247
10	Hill View (A359)	359756	125228
11	Vale Farm (Camel Hill)	358175	126071

Receptors – Ecological

17.1.33 There are 5 Designated Sites within 200 metres of the affected road network for the scheme:

- Charnage Down Chalk Pit SSSI
- Stockton Wood and Down SSSI (E1)
- Whitesheet Hill SSSI (E2)
- Yarnbury Castle SSSI (E3)
- Parsonage Down SSSI (E4)

17.1.34 All the above Designated Sites, except Charnage Down Chalk Pit SSSI, have been designated for the presence of chalk grassland which supports many notable, and in some cases rare, species of flora, some of which may be sensitive to NO_x and nitrogen deposition. In addition, the Stockton Wood and Down SSSI consists of scrub and woodland. Charnage Down Chalk Pit SSSI is designated for geological reasons so is not considered sensitive to air pollution and therefore was not considered further in the assessment.

17.1.35 Concentrations of NO_x were predicted within these four Designated Sites using the DMRB Screening Method along receptor transects at 10m intervals within the Designated Sites, up to 200m away from affected roads.

17.1.36 Table B.4 below and the drawing contained in Appendix B.4 presents the location of the nearest point of the Designated Site and its distance to the adjacent affected road.

Table B.4: Sensitive Receptors

Receptor ID	Receptor	Distance from nearest affected road (m)	OS Grid Reference	
			X	Y
E1	Stockton Wood and Down (SSSI)	10	397144	135528
E2	Whitesheet Hill (SSSI)	152	381823	133031
E3	Yarnbury Castle (SSSI)	83	403640	140153
E4	Parsonage Down (SSSI)	196	405840	140877

Compliance Risk Assessment

17.1.37 IAN 175/13 provides guidance in relation to the assessment of the risk of the proposed scheme being non-compliant with the EU Directive. The compliance risk assessment is undertaken using the results obtained from the local air quality assessment. To undertake the compliance risk assessment the following information is required:

- Local air quality modelled results

- Defra's Pollution Climate Mapping (PCM) model outputs for the compliance road network
- Defra's zones and agglomeration maps

17.1.38 Defra's Pollution Climate Mapping (PCM) model is used to report compliance with the EU limit values and provides NO_2 concentrations for a number of roads across the UK for a selection of future years. For the assessment, the 2015 PCM data was used. The 2015 PCM model provides projections for the years 2013, 2020, 2025 and 2030, with projected NO_2 concentrations declining year on year in response to anticipated improvements in vehicle emissions.

17.1.39 To determine the study area for the compliance risk assessment, the local air quality affected road network (ARN), as defined in paragraph 5.4.2, and the road network from the PCM model is used. A compliance risk road network (CRRN) is then defined where the two networks overlap, which then forms the basis for the assessment of compliance risk. In the scheme Opening Year (2023) there were no PCM links which overlap with the ARN. In addition, there were no PCM links within 10 kilometres of the scheme exceeding 40µg/m^3 for the opening year of 2023. Based on projected roadside NO_2 concentrations in the 2015 version of the PCM model, the PCM link closest to the scheme, (on Ilchester Road) predicts a 2023 annual NO_2 concentration of 15µg/m^3, which is well below the annual mean limit value of 40µg/m^3 for NO_2.

17.1.40 Based on 2015 PCM data and the local air quality results obtained in this assessment, it is considered unlikely that there would be an exceedance of the EU NO_2 limit value in the Opening Year of the scheme (2023).

17.1.41 The scheme is therefore considered to have a low compliance risk rating, in accordance with IAN175/13, and no further consideration of scheme effects in relation to compliance with the EU Directive has been undertaken. This will be reassessed in the ES using the new PCM Baseline model, which was released in September 2017. Using this revised PCM data, the ES will consider yearly intervals and will therefore assess the scheme Opening Year.

Appendix B.2 - Model verification

Methodology

17.1.42 Model verification is a process by which checks are carried out to determine the performance of a model at a local level, primarily by the comparison of modelled results with monitoring data. The verification process benefits an assessment by investigating uncertainties and minimising them either through informed refinement of model input parameters or adjustment of the model output if it is deemed necessary.

17.1.43 Guidance produced by Defra (TG16) provides a methodology for model verification including calculation methods and directions on the suitability of monitoring data.

17.1.44 Verification of modelled 2016 annual mean NO_2 concentrations has been undertaken utilising monitoring results from relevant diffusion tube sites within the study area.

17.1.45 Background concentrations used in the model verification have been taken from Defra AIR and, following comparison with background air quality monitoring sites, were uplifted using the factors discussed in paragraph 17.1.17 in Appendix B.1 and are presented in Table B.5 below.

Table B.5: Adjusted Defra background pollutant map data for verification

Grid square	2016	
	NO_x (µg/m^3)	NO_2 (µg/m^3)
349500, 120500	8.6	11.0
352500, 123500	8.4	10.8
354500, 123500	8.0	10.3
354500, 125500	8.4	10.8
356500, 124500	8.5	10.9
357500, 125500	8.2	10.5
358500, 125500	8.3	10.6
360500, 126500	9.3	12.1
363500, 126500	8.4	10.7

Note: Background concentrations have been uplifted by a factor of 1.12 (NOx) and 1.15 (NO_2) and have not been sector removed

17.1.46 Data from South Somerset District Council and the scheme monitoring was then reviewed and only sites that are in areas representative of receptors used within the DMRB simple assessment have been included in the verification process.

17.1.47 No South Somerset District Council sites met this criterion as all the monitoring sites were greater than 7 kilometres from the local ARNs therefore were not considered representative of the assessment receptors.

17.1.48 Twelve scheme specific monitoring sites were used for verification. The exact location of each of the sites was confirmed from street photography taken during commissioning of the monitoring survey. Diffusion tubes 007 and 013

were excluded from verification as they are in locations which are not representative of the receptors used in the DMRB simple assessment. Diffusion tube 012 was excluded as the tube was located on a bridge above the A303 (greater than 5m) and therefore is not considered a roadside location.

17.1.49 The location of the monitoring sites used in model verification are indicated in Appendix B.8. The scheme monitoring sites were annualised and bias adjusted in accordance with Defra guidance. Table B.6 presents the monitoring data used within the model verification.

Table B.6: Monitoring data used within model verification

Site ID	OS Grid reference		2016 Annual Mean (NO_2) µg/m^3
	X	Y	
A303SPAR_001	363096	126330	13.3
A303SPAR_002	360781	126516	11.7
A303SPAR_003	360913	126904	13.3
A303SPAR_004	360471	126423	18.7
A303SPAR_005	358967	125551	19.7
A303SPAR_006	357851	125391	19.8
A303SPAR_008	357724	125321	25.6
A303SPAR_009	357074	125029	28.6
A303SPAR_010	356760	124922	29.7
A303SPAR_011	354621	125071	14.4
A303SPAR_014	352190	123964	20.8
A303SPAR_015	349768	120271	13.7

Results

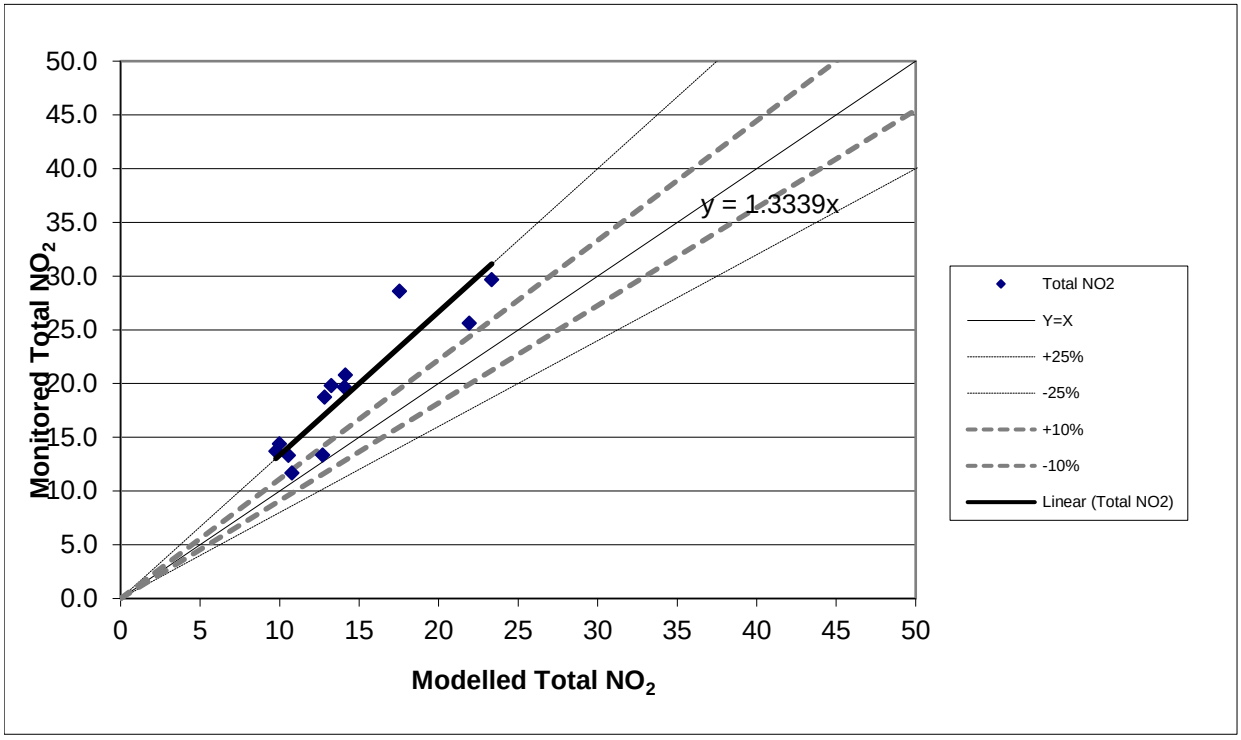
17.1.50 Table B.7 and Figure B.1 presents a comparison of the monitored and modelled concentrations of NOx and NO_2 at the diffusion tube sites for the year 2016. The screening model appears to systematically under predict NO_2 concentrations at all locations; model under prediction ranges from 4.8 to 38.6%.

Table B.7: Unadjusted model verification results

Site ID	Monitored Road NO_x (µg/m^3)	Modelled Road NO_x (µg/m^3)	Monitored Total NO_2 (µg/m^3)	Modelled Total NO_2 (µg/m^3)	Total NO_2 % Difference
A303SPAR_001	9.1	4.0	13.3	10.6	-20.6
A303SPAR_002	4.3	2.6	11.7	10.8	-7.7
A303SPAR_003	7.4	6.2	13.3	12.7	-4.8
A303SPAR_004	17.7	6.4	18.7	12.8	-31.5
A303SPAR_005	21.5	10.7	19.7	14.1	-28.4
A303SPAR_006	22.0	9.4	19.8	13.3	-33.1
A303SPAR_008	33.9	28.5	25.6	21.9	-14.4
A303SPAR_009	40.2	17.6	28.6	17.5	-38.6
A303SPAR_010	42.0	29.2	29.7	23.3	-21.3
A303SPAR_011	11.0	2.8	14.4	10.0	-30.6
A303SPAR_014	23.6	11.3	20.8	14.1	-32.0
A303SPAR_015	9.5	2.5	13.7	9.8	-28.8

17.1.51 Following Defra guidance, modelled and monitored road traffic concentrations have been compared to derive a verification factor of 1.6 which been applied to the modelled NO_x results.

Figure B.1: Unadjusted model verification results (annual mean NO_2, µg/m^3)



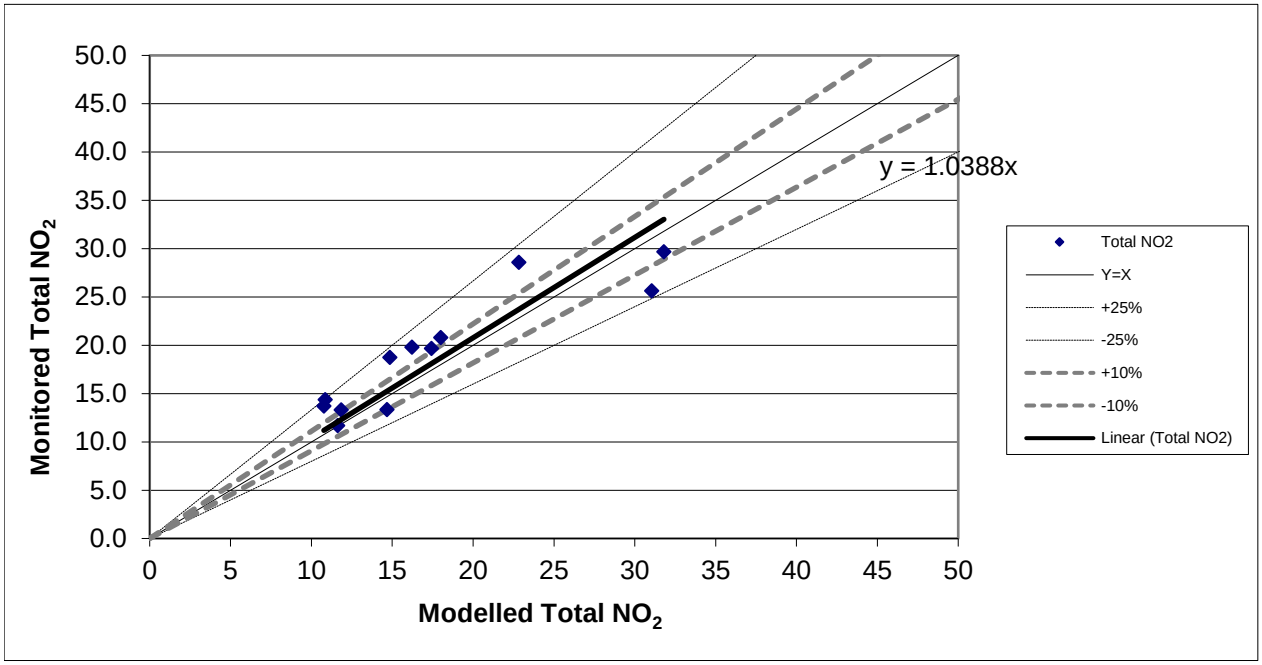
17.1.52 Table B.8 and Figure B.2 present the adjusted modelled NO_2 against monitored NO_2 at the verification sites. Following adjustment, the model predicts annual mean NO_2 concentrations within 25% of the monitored concentrations at all monitoring sites, 3 of which are within 10% of the monitored concentration. The Screening Method therefore performs adequately at these locations following adjustment. The Screening Method under predicts annual mean NO_2 concentrations at locations well below the annual mean NO_2 objective and over predicts at locations with higher monitored annual mean NO_2 (e.g. those above 30µg/m^3). Therefore, there is low risk of the Screening Method under predicting annual mean NO_2 at locations close to the annual mean NO_2 objective and considering the existing concentrations in the study area the results are considered robust.

Table B.8: Adjusted model verification results

Site ID	Monitored Total NO_2 (µg/m^3)	Modelled Total NO_2 (µg/m^3)	% Difference
A303SPAR_001_1215	13.3	11.8	-11.0
A303SPAR_002_1215	11.7	11.6	-0.4
A303SPAR_003_1215	13.3	14.7	10.0
A303SPAR_004_1215	18.7	14.9	-20.6
A303SPAR_005_1215	19.7	17.4	-11.4
A303SPAR_006_1215	19.8	16.2	-18.2
A303SPAR_008_1215	25.6	31.0	21.2
A303SPAR_009_1215	28.6	22.8	-20.1
A303SPAR_010_1215	29.7	31.8	7.2

A303SPAR_011_1215	14.4	10.9	-24.4
A303SPAR_014_1215	20.8	18.0	-13.4
A303SPAR_015_1215	13.7	10.8	-21.5

Figure B.2: Adjusted model verification results (annual mean NO_2, µg/m^3)



17.1.53 Table B.9 presents statistical parameters for describing model uncertainty. The Root Mean Square Error (RMSE) is used to define the average error or uncertainty of the model. The results of the RMSE calculation in this case are concentrations of NO_2 measured in units of micrograms per metre cubed. Table B.9 shows that before adjustment the model uncertainty was plus or minus 5.57µg/m^3 or 13.9% of the annual mean NO_2 objective. After adjustment the model uncertainty is reduced to plus or minus 3.32µg/m^3 or 8.3% of the annual mean NO_2 objective. After adjustment, the model uncertainty is within the desired 10% of the relevant objective, as recommended by Defra guidance.

17.1.54 Fractional Bias (FB) is used to identify if the model shows a tendency to over or under predict and values can vary between +2 and -2 and have an ideal value of 0. Negative values suggest a model over-prediction and positive values suggest a model under-prediction. Table B.9 shows that before adjustment the model is under-predicting annual mean NO2 concentrations. Following adjustment, the model is close to the desired FB value of 0 with a slight tendency to over-predict.

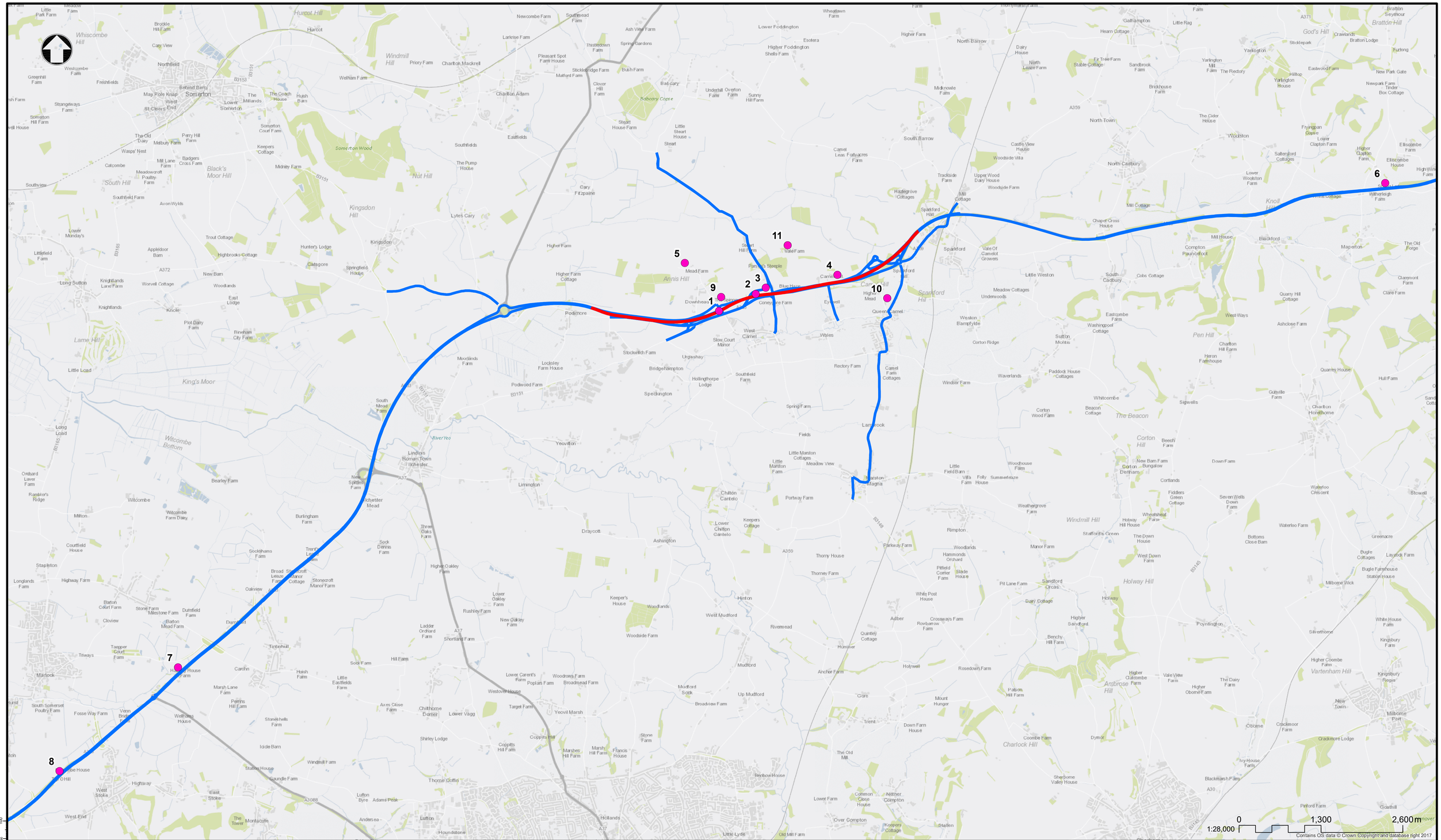
17.1.55 The correlation coefficient (R) is used to measure the linear relationship between modelled and measured data. A value of zero means no relationship and a value of 1 means absolute relationship. The value of R improves from 1.33 to 1.04 following model adjustment.

Table B.9: Description of model uncertainty

Statistical Parameter	Before Adjustment	After Adjustment	Ideal Value
Root Mean Square Error	5.57	3.32	0
Fractional Bias	0.29	0.08	0
Correlation Coefficient	1.33	1.04	1

17.1.56 The statistical analysis above demonstrates that the model performs adequately versus monitoring data, following adjustment. An adjustment factor of 1.6 has therefore been applied to modelled road NOx contributions at all receptors.

Appendix B.3 – Air quality human health receptors



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Legend

- Human health receptors representative for the purposes of the assessment
- Scheme Centreline
- Local Affected Road Network (2023)

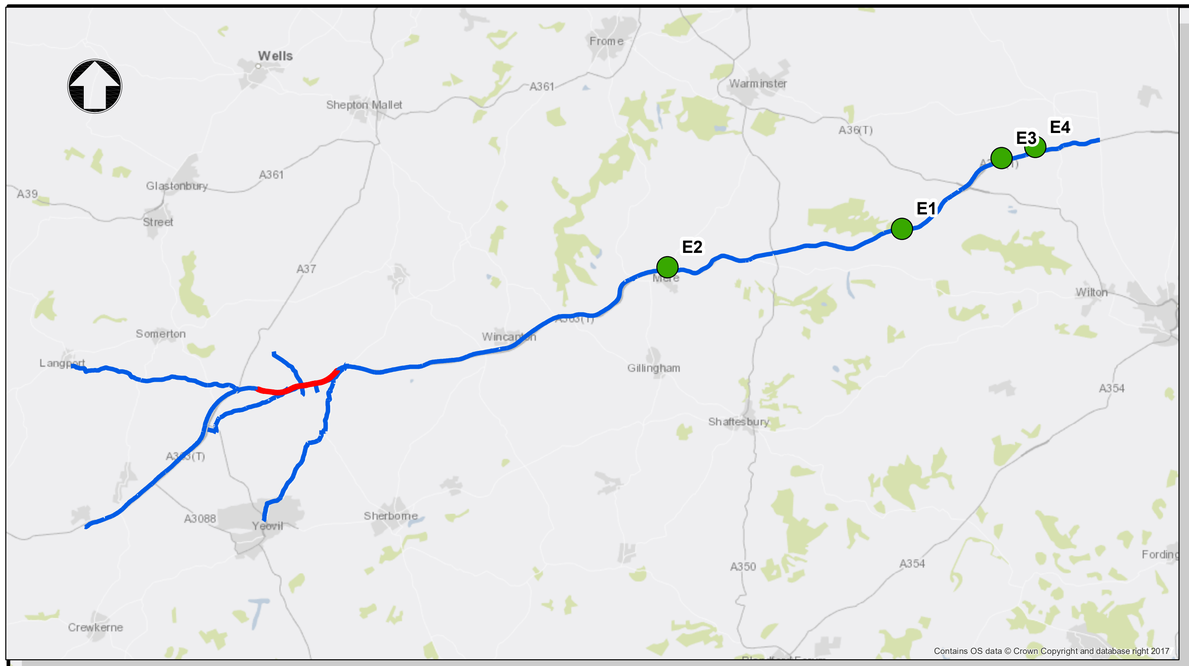
Project Title

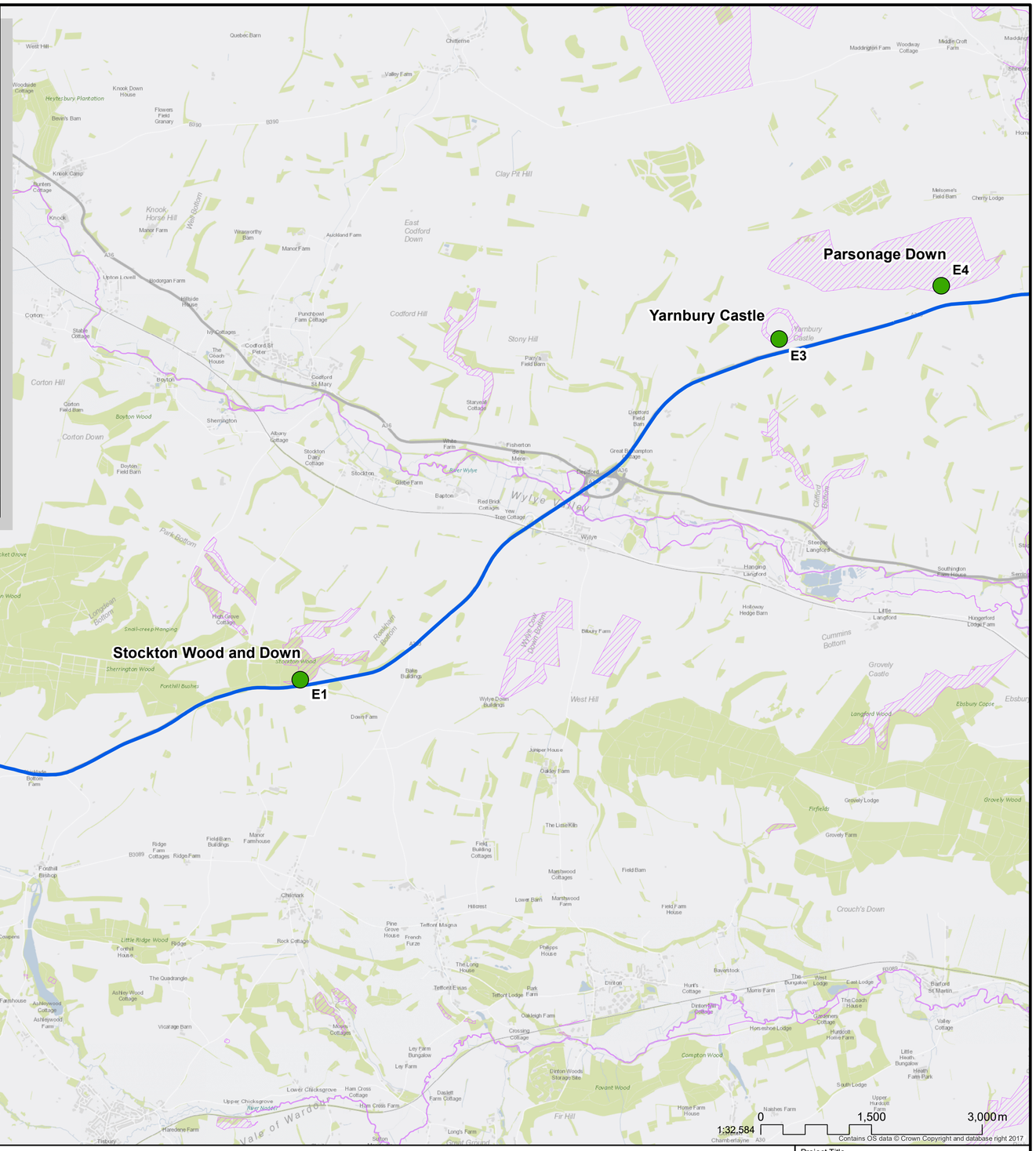
A303 Sparkford to Ilchester Dualling

Drawing Title

Air Quality Human Health Receptors

Appendix B.4 –Air quality ecological receptors





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Legend

- Ecological receptor
- Scheme Centreline
- Local Affected Road Network (2023)
- Site of Special Scientific Interest

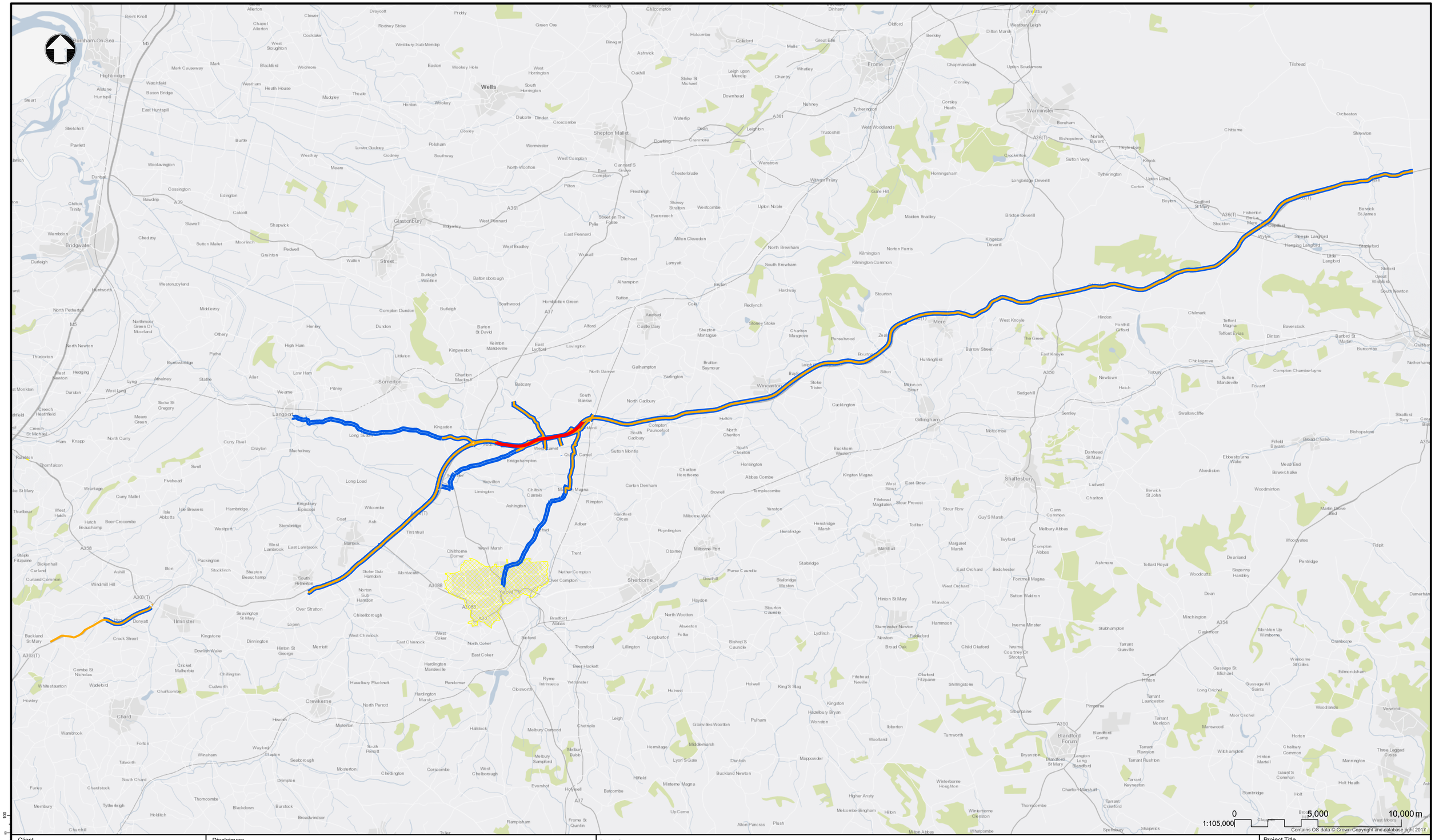
Project Title

A303 Sparkford to Ilchester Dualling

Drawing Title

Air Quality Ecological Receptor Locations

Appendix B.5 – Local Affected Road Network



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Legend

- Scheme Centreline
- 2023 Local Affected Road Network
- 2038 Local Affected Road Network
- Yeovil AQMA

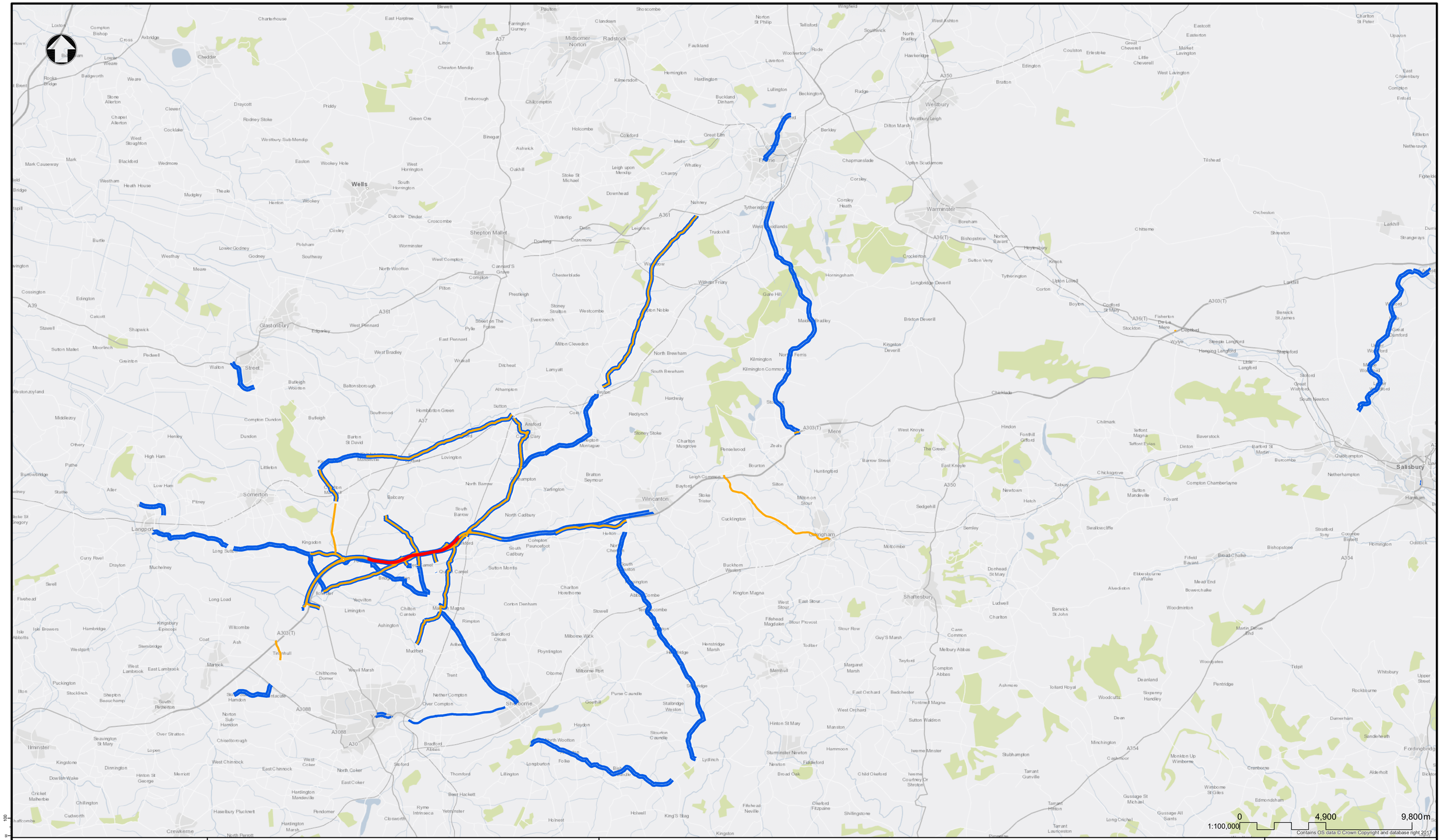
Project Title

A303 Sparkford to Ilchester Dualling

Drawing Title

Local Affected Road Network

Appendix B.6 – Regional affected road network



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Legend

- Scheme Centreline
- 2023 Regional Affected Road Network
- 2038 Regional Affected Road Network

Project Title

A303 Sparkford to Ilchester Dualling

Drawing Title

Regional Affected Road Network

Appendix B.7 – Monitoring survey information

A monitoring survey of NO_2 concentrations at 16 sites in the study area was carried out from January 2016 to June 2016. Monitoring was carried out using diffusion tubes, which are passive method designed to provide information on long-term trends and existing concentrations. The tubes are exposed at each location for approximately one month, then collected, sent back to a laboratory for analysis and replaced with new tubes.

The tubes were prepared and analysed by Staffordshire Scientific Services using the 20% TEA in water method.

B.2.1 Monitoring Locations

Monitoring sites were selected based on their proximity to major roads and junctions likely to be affected by the proposed scheme and at locations where sensitive receptors are present. The location of each tube is indicated in the drawing contained within B.9.

The raw data obtained from the six-month diffusion tube survey was annualised and bias adjusted to enable comparison with the annual mean NO_2 objective. The methodology behind the adjustment process is outlined below.

B.2.2 Bias Adjustment

Diffusion tubes are less accurate than continuous monitoring methods and typically under or over-read concentrations. In order to correct for this, diffusion tubes are co-located with continuous monitoring stations, and a bias adjustment factor is calculated by comparing results from both techniques. Mouchel included three diffusion tubes within the monitoring survey co-located with Charlton Mackrell AURN site. The results from these tubes was compared to the results from the AURN for the same period which provided a bias adjustment factor of 0.94.

B.2.3 Annual Adjustment

Since the diffusion survey was taken from January 2016 to June 2016, it was necessary to convert the period data to an annual mean concentration for 2016 for comparison with the annual mean NO_2 objective. The bias adjusted diffusion tube data was converted to a representative annual mean for 2016 using the approach outlined in Box 7.9 of Defra TG16.

Automatic monitoring data was obtained from background automatic monitoring stations within 50 miles of the scheme shown in Table B.6 and the period average concentration was compared to the annual mean concentration monitored for the stations in 2016.

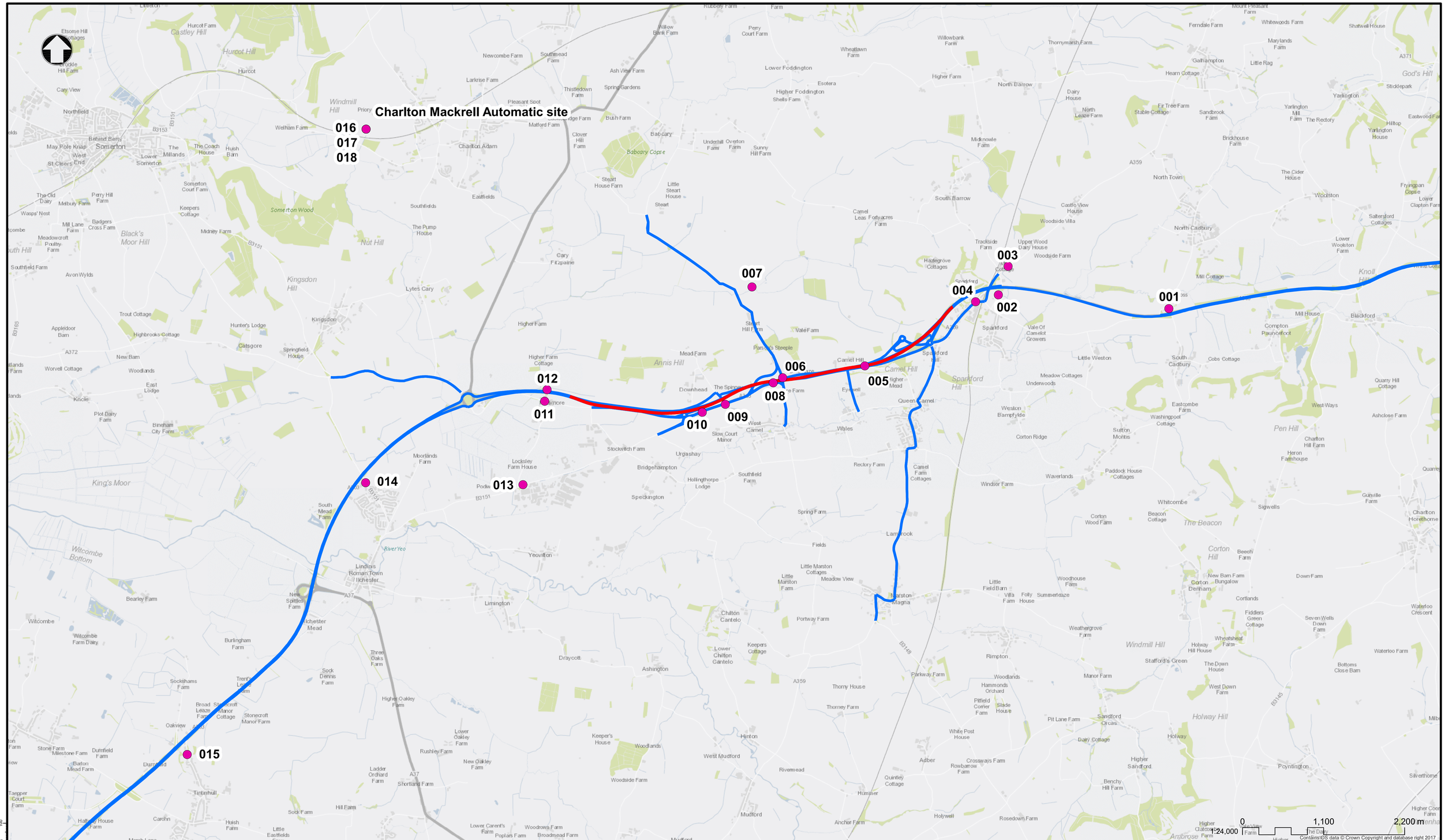
Table B.6 Annualisation Factors

Site ID	Honiton AURN		Charlton Mackrell AURN	
	ug/m^3	% DC*	ug/m^3	% DC*
Period Mean NO_2 ** (µg/m^3)	7.7	99	6.7	99
2016 Mean NO_2 (µg/m^3)	8.1	96	7.4	99
Annualisation factor	1.06		1.10	

*Average for 2016
* DC = Data Capture
**Average for period 14/12/2015 to 17/06/2016

An average annualisation factor of 1.08 was obtained from the Honiton and Charlton Mackrell automatic monitoring stations. The annualisation factor was applied to the bias adjusted diffusion tube results to convert to an annual mean value for 2016.

Appendix B.8 – Air quality monitoring locations



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Legend

- Monitoring sites
- Scheme Centreline
- Local Affected Road Network (2023)

Project Title

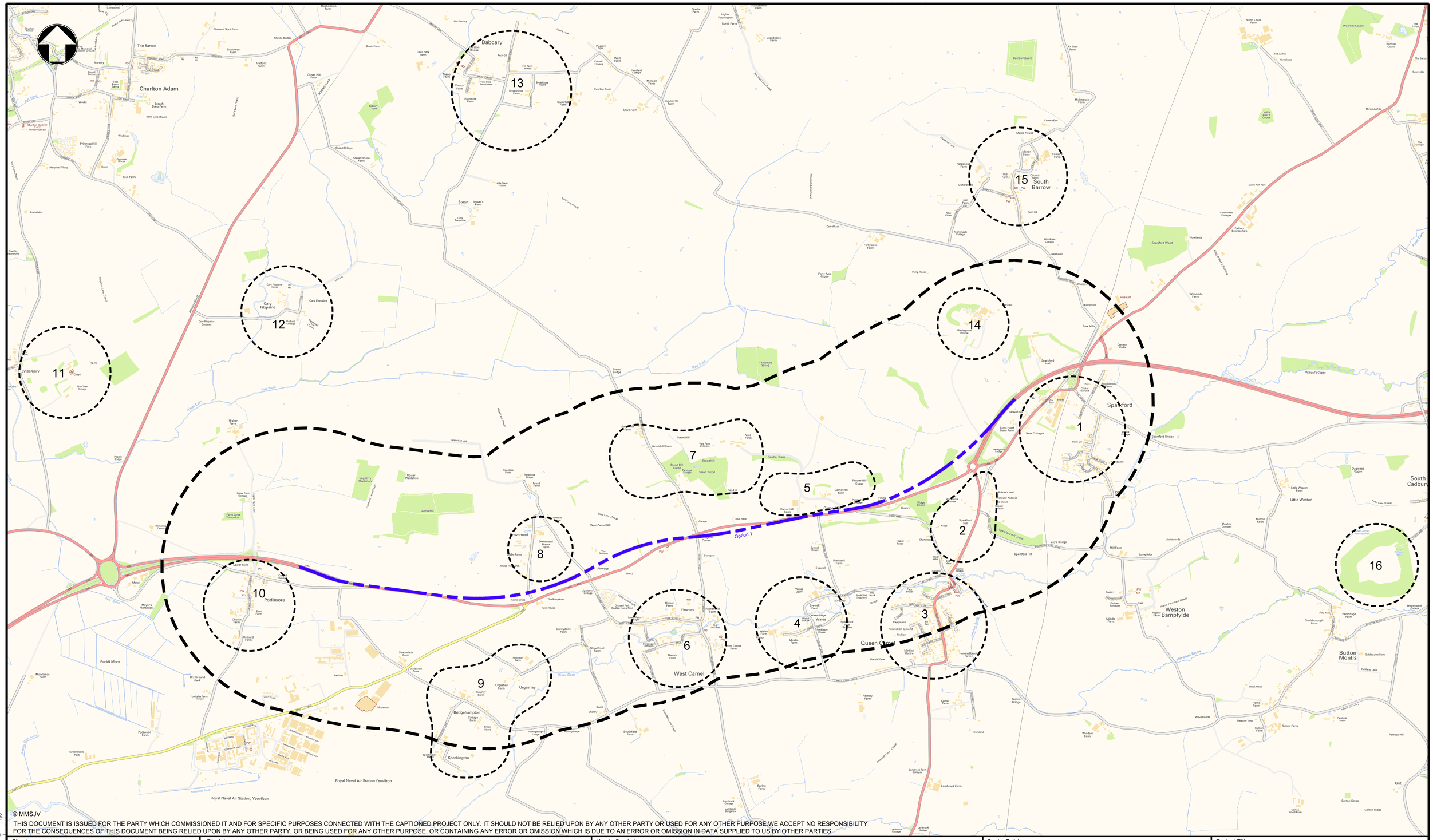
A303 Sparkford to Ilchester Dualling

Drawing Title

Air Quality Monitoring Locations

Appendix C: Landscape

Appendix C.1 – Visual receptor plan


Babcary
13
Broadclose Farm
Cary Fitzpaine
12
Cary Fitzpaine House
Lytes Cary
11
Chapel
Charlton Adam
The Barton
Charlton Mackrell C of E Primary School
Princess Hill Park
Trout Farm
Steart
Steart Bridge
Steart House Farm
Little Steart House
Steart Bower's Farm
Cider Bungalow
Option 1
7
Steart Hill
Steart Wood
North Hill Farm
Vale Farm Cottages
Rawlsbar Brake
5
Carnel Hill Farm
Carnel Hill Copse
Pepper Hill Copse
8
Downhead
Downhead Manor Farm
Yarnhead
Yarnhead Farm
Ansells Hill
Podimore
10
Puddi Moor
Podimore Bridge
Mayer's Plantation
Higher Farm
Higher Farm Cottages
Farm Lane Plantation
Cloghenny Plantation
Bower Plantation
Ansells Hill
9
Urgashay
Urgashay Farm
Country Farm
Bridgehampton
Speckington
Royal Naval Air Station Yeovilton
Royal Naval Air Station, Yeovilton
6
West Camel
Nash's Farm
Higher Farm
Hall
Playground
Village Hall
Church
Primary School
Fenclough Farm
Fenclough Cottages
Lower Farm
Lower Farm Cottages
Wayside
Orchard Park (Mobile Home Site)
Sunnydene Farm
Slow Court Farm
Stockwith Farm
Stockwith Cross
Pavilion
Museum
Depot
Chantry
Hollinghorne Lodge
Hollinghorne
Bridge House
Cottage Farm
Southfield Farm
Spring Farm
Lambrook Cottage
Lambrook Bungalow
Lambrook Farm Cottages
Lambrook Farm
Lambrook Bridge
Wales
4
Wales Farm
Wales Dairy
Wales Bridge
Middle Farm
Eyewell Farm
Eyewell House
Eyewell
Blackwell Farm
Black Wall (Sculpture)
Rock
Church
Queen Camel
3
Park Ridge
Playground
Recreation Ground
Pavilion
Medical Centre
Horsehollow Farm
Queen Camel Cricket Ground
Sparkford
1
Sparkford Hall
Sparkford Bridge
Sparkford Hill
2
Sparkford Hill Copse
Builder's Yard
Milestone Paddock
The Mount
Upper Mount
Jay's Bridge
Chandlers
Higher Mead
Wood View
Lower Mead
Sparkford Hill Farm
Sparkford Hill Cottages
Sparkford Wood
Woodlands
Woodside Farm
Woodgate Cottage
Newhaven
Pump House
Forty Acre Copse
Fortyacres Farm
Carnel Lane
Nightingale Cottage
Hazlegrove House
14
Museum
Sawmills
Pumphrey
Carnelot Works
Long Hazel Dairy Farm
New Cottages
Hazelgrove Cottage
Cricket Ground
Oak Park
Woods
Brookfield
Brookfield Cottage
Ridge
Ridge Copse
Quarry
Lower Quarry
Quarry Cottage
Lower Quarry Cottage
Yeo Lane
Yeo Bridge
Yeo Mill
Yeo Mill Cottage
Yeo Mill Lane (Track)
Yeo Mill Lane (Track)
Yeo Mill Lane (Track)

Appendix D: Biodiversity

Appendix D.1 – Protected species policy and legislation

Species	Legislation
Bats *Chiroptera*	All bat species are protected under the Conservation of Habitat and Species Regulations 2010 and Wildlife and Countryside Act (WCA) 1981. This means it is illegal to: • Deliberately capture, injure or kill a bat • Intentionally or recklessly disturb a bat in its roost or deliberately disturb a group of bats • Damage or destroy a bat roosting place (even if bats are not occupying the roost at the time) • Possess or advertise/sell/exchange a bat (dead or alive) or any part of a bat • Intentionally or recklessly obstruct access to a bat roost.
Badgers *Meles meles*	Badgers and their setts are afforded protection under the Protection of Badgers Act 1992. This Act is in regards to welfare legislation for badgers, due to history persecution, rather than their distribution which is widespread and abundant throughout the countryside. Under this act it is an offence to: • Capture, kill, injure and cruelly or ill-treat a badger • Damage, obstruct or destroy a sett • Disturb a badger when within a sett
Dormice *Muscardinus avellanarius*	Dormice are protected under the Conservation of Habitat and Species Regulations 2012 and by the Wildlife and Countryside Act 1981. This makes it illegal to: • Intentionally or deliberately injure, kill, or take any wild dormouse • Intentionally or deliberately damage, destroy or obstruct any access to any structure or place used for shelter, breeding, or protection by a dormouse • Or to intentionally or recklessly disturb a dormouse whilst it is using such a structure or place • Possess or advertise/sell/exchange a dormouse (dead or alive) or any part of a dormouse
Great crested newts (GCN) *Triturus cristatus*	GCN are fully protected by the Conservation of Habitats and Species Regulations 2010 and under the WCA 1981. This makes it illegal to: • Intentionally or deliberately kill, injure or take any GCN; • Possess or control any live or dead specimen, or anything derived from a GCN • Intentionally or deliberately damage, destroy or obstruct any access to any structure or place used for shelter, breeding, or protection by a GCN • Or to intentionally or recklessly disturb a great crested newt whilst it is using such a structure or place
Widespread reptile species (Slow worm *Anguis fragilis,* Grass snake *Natrix natrix,* Common lizard *Zootoca vivipara,* and Adder *Vipera berus).*	All UK reptile species are protected under the WCA 1981 making it illegal to: • Intentionally or deliberately injure, kill, or take any wild reptile; • Possess or advertise/sell/exchange a reptile (dead or alive) or any part of a reptile.
Breeding birds	All wild birds in the UK are protected under the WCA 1981 making it illegal to: Kill, injure or take any wild bird; • Take, damage or destroy the nest of any wild bird while it is being built or in use • Take or destroy the eggs of any wild bird • Possess or control (e.g. for exhibition or sale any wild bird or egg unless obtained legally) In addition to the above, Schedule 1 bird species are also protected from disturbance, both to their nesting areas and wintering habitats.
Watervoles *Arvicola amphibius*	Water voles are protected under the WCA 1981 (as amended by the Countryside and Rights of Way Act 2000). This legislation makes it an offence to: • Intentionally kill, injure, disturb or take a wild water vole • Intentionally or recklessly damage, destroy or obstruct access to any structure or place used for shelter or protection by this species • Sell, offer for sale or advertise for live or dead water voles • Possess or control a live or dead water vole, or any part of a water vole
Otters *Lutra lutra*	Otters are afforded protection under Schedule 5 and 6 of the WCA and the Conservation Habitats and Species Regulations 2010. This makes it illegal to: • Intentionally kill, injure, disturb or take an otter • Intentionally or recklessly damage, destroy or obstruct access to any place that an otter uses for shelter or protection

Species	Legislation
White clawed crayfish *Austropotamobius pallipes*	White clawed crayfish are legally protected under the Wildlife and Countryside Act 1981 (as amended) under Schedule 5. It is classified as endangered in the IUCN Red List. This makes it illegal to: • Intentionally, or recklessly, kill or injure a WCC • Sell, or attempt to sell, any part of this species, alive or dead

Appendix D.2 – Natural England meeting minutes (3 May 2017)

Highways England RIS Schemes: A358 Taunton to Southfields and A303 Sparkford to Illchester Dualling

Initial Ecology Consultation Meeting

Date:	Tuesday 2 May 2017	**Time:**	11:00 - 12:30
Location:	Natural England, Horizon House, Bristol		
Attendees:	Julia Barrett (JB), Mott MacDonald Sweco Simon Mason (SM), Mott MacDonald Sweco Vicky Hollands (VH), Mott MacDonald Sweco Andrea Evans (AE), Mott MacDonald Sweco Oliver Lowe (OL), Natural England Simon Stonehouse (SS), Natural England Hannah Nelson (HN) Highways England		
Apologies:	N/A		

No.	Actions/Key Messages	Owner
1.0	**Welcome and Introductions**	
	All attendees introduced themselves.	
2.0	**Safety Moment**	
	VH explained that a Health and Safety issue faced by surveyors onsite during the bat survey season is fatigue. MM compensate for this by using staff on a rota and having accommodation nearby.	
3.0	**Background to the Scheme (s)**	
	JB gave an overview of both schemes, how the options have been chosen, the DCO submission date of May 2018 and expected construction start date of 2020.	
4.0	**Purpose of the Meeting**	
	JB explained that the purpose of the meeting was to discuss survey methodology for bats, general protected species surveys and develop mitigation and NE principles.	
5.0	**Bat Survey Methodology**	
	OL confirmed that NE are happy with the general scope of the surveys outlined in the bat survey methodology memo, however concerns were raised regarding the length of the transect surveys. OL suggested that the transect routes could be shortened. SM explained that although the transects are long, surveys are still in	OL

No.	Actions/Key Messages	Owner
	line with the 2016 Bat Conservation Trust (BCT) guidelines (suggests transect lengths of 3-5km). The number of point counts along each transect has been increased from 8 to 10 to provide more data along the long transects. SM also explained that 3 statics are being used per transect. SS agreed the survey effort sounds sufficient but would check with NE bat advisor. SM explained that lesser horse and barbastelle have been identified within the scheme extents of the A358 and A303. The need for additional radiotracking studies for both schemes was discussed and it was concluded that the need for this should be determined by the results of the initial bat activity and roost surveys. Radio tracking is an intrusive method and should only be used where sufficient data cannot be obtained by non-intrusive survey methods. The proximity of various bat Special Areas of Conservation (SACs) to the schemes was also discussed. Previous radiotracking information on Hestercombe House SAC was shown which illustrates that bats associated with this SAC use a core area to the west of the M5 corridor and were unlikely to use habitats within A358 scheme. SM asked NE to comment on the requirement of radio tracking for both schemes. OE will discuss with the NE bat advisor to get clarification and will provide written advice. OL mentioned that due to the presence of late emerging species such as lesser horseshoe, bat activity surveys should be extended to up to 3 hours after sunset to ensure activity was recorded. SM expressed concern that due to land access issues some areas may not be subject to a survey during all or part of the survey season. OL explained that it should be made clear why access couldn't be obtained and a record of what efforts have been made to obtain access should be kept.	
	The need for landscape-scale bat surveys was discussed. A deviation from the bat memo which was submitted to NE in advance of the meeting was discussed, with SM suggesting that due to the number of surveys being undertaken in the 2017 season MM are looking to delay the Landscape transects until 2018. The other surveys will provide robust data for assessing the impacts and any necessary licence applications in advance of the DCO application. The primary aim of the landscape transects is to provide baseline data for monitoring impacts post construction. Undertaking landscape surveys in 2018 would provide this baseline data in advance of construction. OL to speak to NE bat advisor and will confirm whether undertaking landscape scale transects in 2018	OL

No.	Actions/Key Messages	Owner
	post DCO application would be acceptable and provide written advise on this.	
6.0	**Outline of broad ecological surveys for both schemes**	
	VH and AE gave a broad overview of what surveys are being undertaken for each scheme and what notable species have been found to date for both schemes. VH informed NE that lesser horse shoe bats, water voles, reptiles, great crested newts, a dormouse starter nest and evidence of badges have been identified within the study area of the A303. AE informed NE that dormice, have been identified within 2 of the twenty-three dormouse sites set up across the A358, great crested newts have been identified within one of the 114 ponds, in addition a barbastelle bat was caught whilst mist netting, evidence and badgers, water vole and otters have also been identified within the study area of the A358. SM enquired about the survey effort required for terrestrial invertebrates, SM to put together a survey methodology so NE can comment. SS mentioned that the A358 scheme will have a low risk to birds from the Somerset Level SAC from water run off pollution. SM asked for NE if wintering bird surveys were required for both schemes SS confirmed these were not necessary.	SM and OL
7.0	**New GCN policies and application for RIS Schemes**	
	VH enquired whether the new GCN licencing policy would be relevant to both schemes. OL explained that out of the 4 new policies 3 would be relevant and can assist MM with no additional charge. VH to send memo to NE regarding GCN mitigation for the A303, which NE will provide comments on.	
8.0	**Land Access**	
	JB and SM explained that land access for the A358 is a problem as we have a number of areas with no access and areas where land owners have not responded. SS and OL said it should be made clear why access couldn't be obtained and records of what efforts have been made to gain access should be kept.	
9.0	**Mitigation**	
	NE stated that the usual advice applies, avoid, minimise, mitigate and compensate. HN stated that HE is pushing a drive towards no net loss of habitat.	

No.	Actions/Key Messages	Owner
	SM and AE mentioned that there is a large area of ancient woodland that will be directly impacted by the A358 scheme. OL said there is good standing advice on the loss of ancient woodland but could provide more specialist advice. SS explained that evidence needs to be provided that every effort has to be made to avoid or minimise the impact to ancient woodland. VH explained that an area of ancient woodland on the A303 was going to be directly impacted by the scheme, however the route alignment has been changed to avoid this, but there will still be indirect impacts through air quality.	
10.0	**Future engagement / Environmental Working Group**	
	JB confirmed the NE that face to face engagement for broader environmental issued should be held every 4 months, with more focused engagement for specialist areas.	
11.0	**AOB**	
	SS confirmed that landscape advice would be provided as and when required.	

Appendix D.3 - Habitats and protected species identified within the vicinity of the scheme

Habitats

17.1.57 The scope of the works and the potential significance of effects warrant further assessment as the habitats present onsite are considered of National (High), Regional (Medium) and Local (Low) conservation value.

17.1.58 Priority habitats of conservation value have been identified within this study area and are described within this section.

17.1.59 Habitats of negligible ecological value have not been assessed further for nature conservation. This comprises of the Phase 1 Habitat categories of amenity grassland, arable, bare ground, hard standing. buildings, scrub, ephemeral/short perennial, marginal vegetation, poor semi-improved grassland, improved grassland and tall ruderal. Some of these habitats may be considered within the species assessment, if they are integral habitat to the species under assessment.

17.1.60 No invasive species have been identified within the scheme footprint.

Priority Habitats

17.1.61 Priority habitats within the scheme's Zone of Influence (ZoI) consist of hedgerows, broadleaved semi-natural woodland, ditches, parkland, calcareous grassland and ponds.

Hedgerows

17.1.62 There are approximately 113 species poor hedgerows within the ZoI. These comprise 82 intact species poor hedgerows, 7 defunct and 24 species poor hedgerows with trees. These predominantly consist of elder *Sambucus nigra*, hawthorn C*rataegus monogyna* and blackthorn *Prunus spinosa* and are actively managed field boundaries. Although much less frequent, there are five species rich hedgerows present within the ZoI. These include three species rich intact hedgerows and two species rich with trees. These have the above species but also include dogwood *Cornus sanguinea*, wild privet *Ligustrum vulgare*, hazel, ash *Fraxinus excelsior*, English oak *Quercus robur*, buckthorn (*Rhamnus cathartica)* and wayfaring tree *Viburnum lantana*. Notable ground flora species include dog's mercury *Mercurialis perennis*, ground-ivy *Glechoma hederacea,* lesser celandine *Ranunculus ficaria,* lords-and-ladies *Arum maculatum*, male fern *Dryopteris filix-mas,* pendulous sedge *Carex pendula* and herb robert *Geranium robertianum.* Hedgerows are a key habitat for many species of conservation concern and often act as wildlife corridors for many species, allowing movement between other habitats.

17.1.63 Surveys will be undertaken to determine which of these hedgerows are considered important under the Hedgerow Regulations 1997.

Broadleaved semi-natural woodland

17.1.64 There are 9 areas of broadleaved semi-natural woodland within 250 metres of the scheme. Woodlands of key importance due to their high biodiversity value include Ridge Copse, located to the east of the scheme, which is a Local Wildlife Site (LWS) designated as an area of semi-natural broadleaved woodland and quarry workings. Species include ash*,* cherry laurel *Prunus laurocerasus,* English oak*,* field maple *Acer campestre*, hazel, hornbeam *Carpinus betulus, s*ycamore *Acer pseudoplatanus* and wild privet*.* Ground flora species include cleavers *Galium aparine,* enchanter's nightshade *Circaea lutetiana,* hart's tongue *Phyllitis scolopendrium,* ivy *Hedera helix,* lesser celandine*,* Lords-and-ladies *and* wood avens *Geum urbanum.*

17.1.65 Parsons Steeple and Steart Wood are located towards the centre of the scheme on a ridge, forming a continuous belt of escarpment woodland connecting into a smaller woodland known as Rewber Brake. Both woodlands have ancient status and are also a LWS. The habitat is predominantly ash, beech *Fagus sylvatica,* blackthorn*,* elder, English elm *Ulmus procera,* English oak*,* hornbeam, andhorse chestnut *Aesculus hippocastanum*. This woodland is bisected by a number of open rides, creating glades with a species rich ground flora.

17.1.66 Species include barren strawberry *Potentilla sterilis,* bluebell *Hyacinthoides non-scripta,* cowslip *Primula veris,* creeping cinquefoil *Potentilla reptans,* dog's mercury, lords-and-ladies, wild Garlic *Allium ursinum* and herb robert.

17.1.67 Lindsay House Quarry, located further to the west is a small LWS and contains an area of broadleaved woodland with scrub and calcareous grassland. Dominant species include ash, dog rose, *Rosa canina,* dogwood*,* elder, English elm, field maple*,* hawthorn and hazel. Ground flora species include lesser celandine, lords-and-ladies and rough-stalked feather-moss *Brachythecium rutabulum*

17.1.68 There is also an undesignated area of broadleaved woodland, located directly to the south of the Hazlegrove House (Grade II Listed) Registered Park and Garden. It is a relatively small triangular area, with open rides and is actively managed through coppicing and thinning. It lacks an understorey and has a canopy dominated by ash, elder, English elm and field maple. Ground flora species include bugle Ajuga reptans, curled dock Rumex crispus, dog's mercury, enchanter's nightshade, ivy-leaved speedwell *Veronica hederifolia*, lesser celandine, lords-and-ladies and pendulous sedge *Carex pendula*.

17.1.69 There are 4 other small woodland copses present across the scheme and are approximately between 0.5ha to 0.7ha in size. Adjacent to Sparkford Roundabout, are linear belts of broadleaved woodland plantation, providing screening to the A303. Dominant species include hazel, hawthorn, and ash.

17.1.70 These woodlands collectively are of high biodiversity value for wildlife providing numerous functions such as areas of shelter, foraging and allowing connectivity across a largely arable landscape.

Watercourses

17.1.71 The ditches present within the ZoI of the scheme are predominantly field drains, bordered by hedgerows and poor semi improved grassland. They all appear to have been recently excavated, with limited aquatic and marginal vegetation.

Parkland

17.1.72 Towards the east near Sparkford is an area of Registered Park and Garden associated with the Grade II Listed Hazlegrove House which comprises of veteran English oak, sweet chestnut and ash. The grassland is heavily grazed and appears to be poor semi-improved neutral grassland.

Calcareous grassland

17.1.73 There are 2 areas of semi-improved calcareous grassland. These are characterised by the presence of ant hills and species such as pyramidal orchid *Anacamptis pyramidalis* and common knapweed *Centaurea nigra*. The grasslands are located adjacent to the A303, known as Camel Hill Transmitter Site, which is designated a LWS. The other is located north of the A303 within the mosaic of habitats known as Lindsay House Quarry LWS. National Vegetation Classification (NVC) surveys were carried out in June 2017, and a more comprehensive species list was obtained for use as part of the ongoing assessment work.

Ponds

17.1.74 There are 44 ponds within 500 metres of the scheme. They are present across the scheme footprint, but are predominantly located to the north of the A303 and concentrated within the arable and improved grassland fields.

Breeding birds

17.1.75 The woodland, tree lines, watercourses, arable fields and hedgerow habitats have potential to support breeding birds. There are records of notable and protected bird species within the study area. Of particular importance is WCA Schedule 1 species barn owl *Tyto alba* and several BAP priority bird species including skylark *Alauda arvensis* and hedge accentor *Prunella modularis.*

17.1.76 Breeding bird surveys were completed in June 2017. BAP species recorded include sky lark, tree pipit *Anthus trivialis*, common linnet *Carduelis cannabina*, yellowhammer *Emberiza citrinella*, house sparrow *Passer domesticus,* hedge accentor (dunnock), common starling *Sturnus vulgaris* and song thrush *Turdus philomelos*. Schedule 1 species include barn owl and kingfisher *Alcedo atthis.*

Barn owls

17.1.77 Numerous trees and buildings have the potential to support barn owls. The poor semi-improved grassland fields and margins of the arable fields provide suitable areas for barn owls to forage within. Previous surveys (undertaken by Mott MacDonald, 2004) confirmed the presence of 5 nesting sites and 30 potential nesting sites within 1km of the existing A303. In 2016, 29 of these were

accessible and were subject to further external inspections to assess the suitability of each feature and to check visually for signs. In addition, four potential nesting sites were observed in the form of four barn owl boxes and a tree cavity. Ten of the previously identified sites were deemed no longer viable to support the species. No signs of barns owl (i.e. pellets and droppings) were observed during the external surveys.

17.1.78 In 2017, a thorough habitat appraisal and nest site assessment was undertaken up to 1.5 kilometres from the scheme. This has identified 34 potential breeding localities. Further internal surveys to check for breeding evidence have been carried out in July and August 2017.

Protected and notable species

17.1.79 The following species surveys have been completed, however some such as badger bait marking surveys, dormouse surveys and invertebrate surveys are yet to be completed. All ecological survey findings will be presented during the within the ES.

Badgers

17.1.80 The woodland, scrub and hedgerows provide suitable areas for badgers *Meles meles* to construct setts and forage within. A review of existing data has identified a total 36 setts within 500 metres of the scheme (surveys undertaken by Mott MacDonald, 2004). During 2016 and 2017, 5 main, 2 annex, 3 subsidiary and 13 outlier setts were still active. Main setts with recent activity were observed within Annis Hill Wood, Hazlegrove Park LWS, Steart Wood, Camel Hill Transmitter Site LWS, and along the base of a hedgerow to the east of Downhead.

17.1.81 Bait marking surveys are currently being undertaken at the main setts found at Hazlegrove Park LWS, Camel Hill Transmitter Site LWS, and along the base of a hedgerow to the east of Downhead. Access has currently been denied at Annis Hill Wood and Steart Wood. These will commence in March 2018 once access has been reinstated,

Bats

17.1.82 There are existing records of brown long eared *Plecotus auritus* bats at Ridge Copse and Downhead Manor Farm. Serotine *Eptesicus serotinus* bats have also been recorded at Downhead Manor Farm and common pipistrelle *Pipistrellus pipistrellus* bats were identified southeast of Sparkford Roundabout.

17.1.83 The ground assessments assessed all trees within 250 metres of the scheme footprint, identifying more than 100 trees with moderate or high potential to support roosting bats. Features of trees used by bats as roosts include;

- Natural cavities and woodpecker holes
- Cracks/splits in major limbs
- Loose and lifted bark
- Thick, close formed ivy stems

- Dense epitomic growth

17.1.84 The tree lines, woodland, hedgerows and watercourses provide suitable areas for bats to commute and forage.

17.1.85 The building assessments have identified more than 60 buildings within 250 metres of the scheme footprint with bat roost potential. Features of buildings used by bats as roosts include:

- Soffits, fascias, barge-boards, weather boarding
- Between roof felt / membrane and tiles/slates
- Around window frames, in cavity walls, under hanging tiles and lead flashing,
- Roof voids

17.1.86 Bat roosts were confirmed during the initial assessments and through DNA analysis of droppings at the following locations:

- Barbastelle *Barbastella barbastellus* and lesser horseshoe *Rhinolophus hipposideros* bat within a building adjacent to Parsons Steeple/Steart Wood; and,
- Lesser horseshoe bat and brown long eared within a building located at Downhead.

Great crested newts

17.1.87 Great Crested Newts (GCN) *Triturus cristatus* require water bodies for breeding purposes, although they spend much of their life in terrestrial habitat. Water bodies are therefore important features to consider the likely presence of GCN within the ZoI. Forty four ponds have been identified within 500m of the proposed scheme. Access was gained to all ponds and a Habitat Suitability Index (HSI) assessment was undertaken. This identified that 23 ponds were considered to have potential to support GCN.

17.1.88 Surveys were then undertaken on these 23 ponds and the following results were obtained. GCN have been recorded in numerous ponds to the west of Downhead. These ponds form a meta-population and have a medium GCN population.

17.1.89 One GCN was also recorded in a pond to the south of the A303 at Urgashay, constituting a small population.

17.1.90 GCN have been recorded in 4 ponds at the eastern extent of the scheme, at Hazlegrove Park and north of Sparkford Hall. These ponds form a meta-population and have a medium GCN population.

Common reptiles

17.1.91 The poor semi-improved grassland fields, scrub and coppice piles provide sheltering and foraging opportunities for widespread reptiles such as grass snake *Natrix natrix*, slow worm *Anguis fragilis* and common lizards *Zootoca*

vivipara. Surveys have identified small populations of slow worms, grass snakes and common lizards within and adjacent to the scheme footprint.

Dormouse

17.1.92 The woodland and hedgerows present have the potential to support dormice. The hedgerows are largely sub-optimal with limited species diversity. However, woodlands such as Parsons Steeple LWS and Ridge Copse LWS have a good structure, with a high canopy and continuous shrub layer which consisted of a sufficient variety of woody plants to supply a succession of foods throughout the season. Surveys are currently being undertaken in all suitable woodland and hedgerows within 250m of the scheme footprint. No dormice have been found during the April to October surveys.

17.1.93 In woodlands such as Annis Hill Wood, Steart Wood, Rewber Brake and Yarcombe Wood, access was revoked from September onwards. The tubes will be removed in March 2018 and the tubes checked for any remaining evidence such as disused dormouse nests.

Otters and water voles

17.1.94 There are numerous ditches within 250 metres of the scheme. These are generally newly created adjacent to hedgerow boundaries in the arable fields and are not established with vegetation. There is an unnamed ditch to the west of Podimore, near to Higher Farm Lane. This has steep banks (>45°) and an abundance of riparian vegetation, which would provide foraging and sheltering opportunities for water voles. This ditch was surveyed in April and September 2017, however no evidence of water vole or otter was observed.

17.1.95 To the south and east of Yarcombe Wood is a ditch network, which has shallow banks, vegetated with common grassland species, bordering on agricultural land with a hedge running one side and frequent ledges. Water vole burrows and latrines were observed but no evidence of otter was identified.

17.1.96 Dyke Brook is located to the north of the A303 and outside of the 250m buffer. Both evidence of otter and water vole was observed.

17.1.97 To the south of the A303 and outside of the 250m buffer, is the River Cam. There are existing records for both otter and water vole on this section of the River.

Invertebrates

17.1.98 There are no existing records of red listed or county notable species within 250 metres of the scheme. However, the woodlands and grasslands designated as local wildlife sites do provide suitable habitat for a variety of invertebrate species. Surveys were undertaken in July and September 2017 and the data is currently being analysed. Due to the presence of blackthorn, brown hair streak surveys will be undertaken during winter 2017. A spring survey for invertebrates will commence in April 2018, to ensure a full suite of surveys has been undertaken.

17.1.99 There are two ditches within close proximity to the footprint of the scheme, at the eastern extent of the scheme. Macro invertebrate surveys have been undertaken and the data is currently being analysed.

White Clawed Crayfish

17.1.100 The watercourses such as the ditches in close proximity to the scheme, do not provide suitable habitat for white clawed crayfish. Therefore, no further surveys for this species has been undertaken.

Overwintering birds

17.1.101 The habitats within the scheme footprint and adjacent to it, provide low potential habitat for overwintering bird species. There are also no internationally designated sites within 2 kilometres that include overwintering bird species as qualifying features. Therefore, overwintering birds are not considered further in this assessment.

Other species

17.1.102 The woodland and grassland habitats provide ideal habitat for deer to shelter and forage within. Roe deer have been observed during other protected species surveys and are present across the scheme footprint, north of the A303.

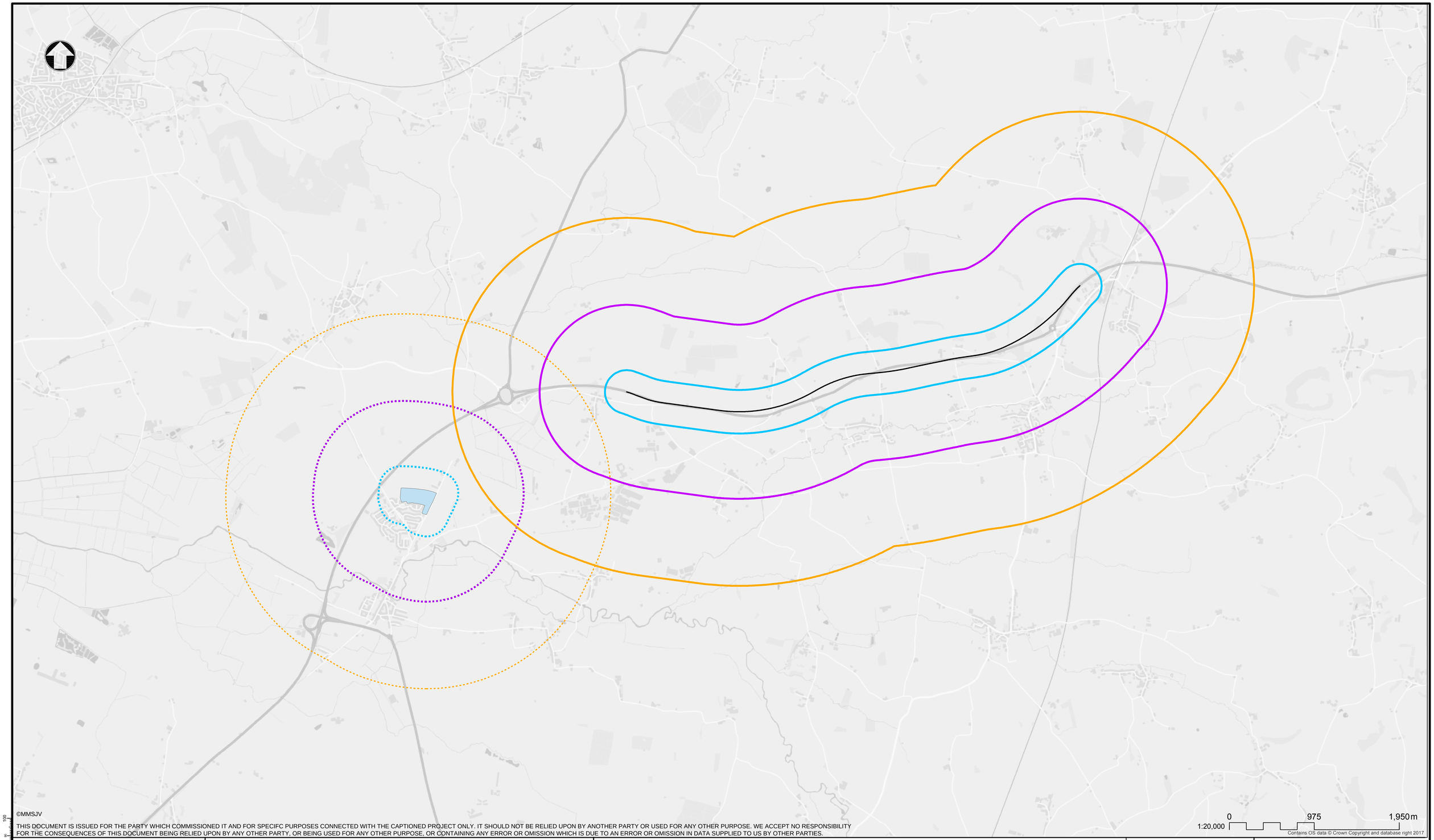
Appendix E: Combined and cumulative effects

Appendix E.1 – List of other developments

Other Development details						Stage 1		Stage 2			
ID	**Application Reference/ Policy Reference**	**Applicant for Other Development and brief description**	**Distance from scheme**	**Status**	**Tier***	**Within ZOI?**	**Progress to Stage 2?**	**Overlap in temporal scale**	**Scale and nature of development likely to have a significant effect**	**Other factors**	**Progress to Stage 3/4?**
Within 2km buffer of scheme											
1	HELAA Site Ref No.: E/QUCA/0001/A	**Other Development:** Rectory Farm **Site Address:** West Camel Road **Applicant:** No applicant associated with development. Development land identified in the HELAA. **Development Description:**1.4 ha land with proposed use of 400 housing/affordable/10,750 sq m B1 (combined with 0001/B & 00001/C)	1.3km	No planning application at present.	3	Yes	No. A planning application with this development has not been accepted.				
2	HELAA Site Ref No.: E/QUCA/0001/B	**Other Development:** Rectory Farm **Site Address:** West Camel Road **Applicant:** No applicant associated with development. Development land identified in the HELAA. **Development Description:** 3.2ha land with proposed use of 400 housing/affordable/10,750 sq m B1 (combined with 0001/A & 00001/C)	1.2km	No planning application at present.	3	Yes	No. A planning application with this development has not been accepted.				
3	HELAA Site Ref No.: E/QUCA/0001/C	**Other Development:** Rectory Farm **Site Address:** West Camel Road **Applicant:** No applicant associated with development. Development land identified in the HELAA. **Development Description:** 8.84ha of land with proposed use of 400 housing/affordable/10,750 sq m B1 (combined with 0001/A & 00001/B)	890m	No planning application at present.	3	Yes	No. A planning application with this development has not been accepted.				
4	HELAA Site Ref No.: E/SPAR/0001	**Other Development:** Long Hazel Farm (caravan park) **Site Address:** High Street **Applicant:** No applicant associated with development. Development land identified in the HELAA. **Development Description:** 2.49 ha of land. Use of land for the siting of 21 permanently occupied residential mobile homes.	Adjacent	No planning application at present.	3	Yes	No. A planning application with this development has not been accepted.				
5	HELAA Site Ref No.: E/SPAR/0003	**Other Development:** The Orchard **Site Address:** Cherry Pie Lane **Applicant:** No applicant associated with development. Development land identified in the HELAA. **Development Description:** 0.75ha of land for housing/care home	350m	No planning application at present.	3	Yes	No. A planning application with this development has not been accepted.				
6	HELAA Site Ref No.: E/SPAR/0004	**Other Development:** Land off Wolverlands **Site Address:** Sparkford **Applicant:** No applicant associated with development. Development land identified in the HELAA. **Development Description:** 1ha of land for the proposed use of housing.	140m	No planning application at present.	3	Yes	No. A planning application with this development has not been accepted.				
7	HELAA Site Ref No.: E/SPAR/0005	**Other Development:** Haynes Publishing **Site Address:** Unknown **Applicant:** No applicant associated with development. Development land identified in the HELAA. **Development Description:** 2.3ha of land for proposed use of housing approximately 38 and B1 approximately 2260 sq m. **See application 16/00725/OUT below**	160m	No planning application at present.	3	Yes	No. A planning application with this development has not been accepted.				
8	HELAA Site Ref No.: E/SPAR/1200	**Other Development:** Land at Brains Lane **Site Address:** Brains Lane, Sparkford **Applicant:** No applicant associated with development. Development land identified in the HELAA. **Development Description:** 2.1ha of land for the proposed use of employment.	450m	No planning application at present.	3	Yes	No. A planning application with this development has not been accepted.				
9	HELAA Site Ref No.: E/NOCA/0003	**Other Development:** Land West of Cadbury Business Park **Site Address:** Land to the west of Cadbury Business Parl. Galhampton. **Applicant:** No applicant associated with development. Development land identified in the HELAA. **Development Description:** 1.75ha of land suitable for economic development with potential scope for approximately 5000 sq. m of floor space for B uses. Other potential sui generis employment uses.	1.7km	No planning application at present.	3	Yes	No. A planning application with this development has not been accepted.				
10	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.	150m	Outline Planning permission granted on 29 March 2017	1	Yes	Yes. Falls within ZOIs for all environmental topic disciplines.	Overlap in temporal scale is unknown at present.	This development was not subject to a statutory EIA. The proposed development lies within close proximity to the eastern tip of the scheme, and therefore the potential for cumulative effects associated with environmental disciplines for which the ZOIs overlap for.	N/A	Yes
11	15/02779/EIASS	**Other Development:** Propose 8 Hectares Photovoltaic Park **Site Address:** Land at OS110, Bindwell Lane, Queen Camel, Yeovil, Somerset **Applicant:** St John Hughes	1.8km	EIA Screening and Scoping Request	2	Yes	No. A full planning application has not been submitted.				

Other Development details						Stage 1		Stage 2			
ID	**Application Reference/ Policy Reference**	**Applicant for Other Development and brief description**	**Distance from scheme**	**Status**	**Tier***	**Within ZOI?**	**Progress to Stage 2?**	**Overlap in temporal scale**	**Scale and nature of development likely to have a significant effect**	**Other factors**	**Progress to Stage 3/4?**
		Development Description: The solar farm is designed to deliver up to 5MW of electricity, and is comprised of photovoltaic panels mounted on fixed metal frames, inverter technology, an on-site "containerised" sub-station, perimeter security fencing, and suitable access for construction and maintenance work.		submitted June 2015. Decision of EIA not required July 2015.							
12	10/01023/EIASS	**Other Development:** Proposed hotel, events area and exhibition track at land at and opposite Haynes Motor Museum, Sparkford **Site Address:** Land OS 1300 and 0183 Part, Cary Road, Sparkford, Yeovil, Somerset, BA22 7LH **Applicant:** Boon Brown Architects **Development Description:** Proposed hotel, events area and exhibition track at land at and opposite Haynes Motor Museum	670m	EIA Screening and Scoping Request submitted March 2010. Decision of EIA required April 2010.	2	Yes	No. A full planning application has not been submitted.				
13	14/04945/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)	1.2km f	Construction complete.	1	Yes. Falls within ZOI for ecology, cultural heritage, landscape, geology and soils, noise, and water environment.	No. This development has finished construction.				
	15/00788/R3C	**Other Development:** As above **Site Address:** As above **Applicant:** As above **Development Description:** Section 73 application to change the timing requirements of the submission of further details by varying conditions 6, 7, 8 and 9 of planning permission 14/04945/R3C.									
14	16/03193/FUL	**Other Development:** Proposed straw barn, landscape bund and associated ancillary works (revised scheme – 16/01219/FUL) **Site Address:** Steart Hill Farm, Steart Hill, West Camel, Yeovil, Somerset, BA22 7RF **Applicant:** Hopkins Development Ltd **Development Description:** Erection of a straw barn, landscape bund, and associated ancillary works, at land at Steart Hill, West Camel (2.61ha).	800m	Application refused October 2016. Appeal lodged March 2017. Appeal in process.	1	Yes	No. Application has been refused and is currently going through appeal. Also, due to the nature of the scheme, any environmental effects are likely to be minimal.				
Just outside 2km buffer of the scheme											
15	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	2.35	Outline Planning Permission granted on 11 December 2015.	1	Yes. Falls within the ZOI for ecology.	Yes	Overlap in temporal scale is unknown at present.	This development was not subject to a statutory EIA. Potential effects associated with the ecology, although effects are not likely to be significant.	N/A	Yes

Appendix E.2 – Drawings to show the locations of the Other Developments in relation to the scheme



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Key to symbols

SCHEME CENTRELINE

250M ZONE OF INFLUENCE

GEOLOGY AND SOILS, PEOPLE AND COMMUNITIES

1KM ZONE OF INFLUENCE

LANDSCAPE, CULTURAL HERITAGE, ROAD DRAINAGE AND WATER ENVIRONMENT

2KM ZONE OF INFLUENCE

BIODIVERSITY

OTHER DEVELOPMENT

LAND NORTH OF TROUBRIDGE PARK (15.00024.OUT)

250M ZONE OF INFLUENCE

GEOLOGY AND SOILS, PEOPLE AND COMMUNITIES

1KM ZONE OF INFLUENCE

LANDSCAPE, CULTURAL HERITAGE, ROAD DRAINAGE AND WATER ENVIRONMENT

2KM ZONE OF INFLUENCE

BIODIVERSITY

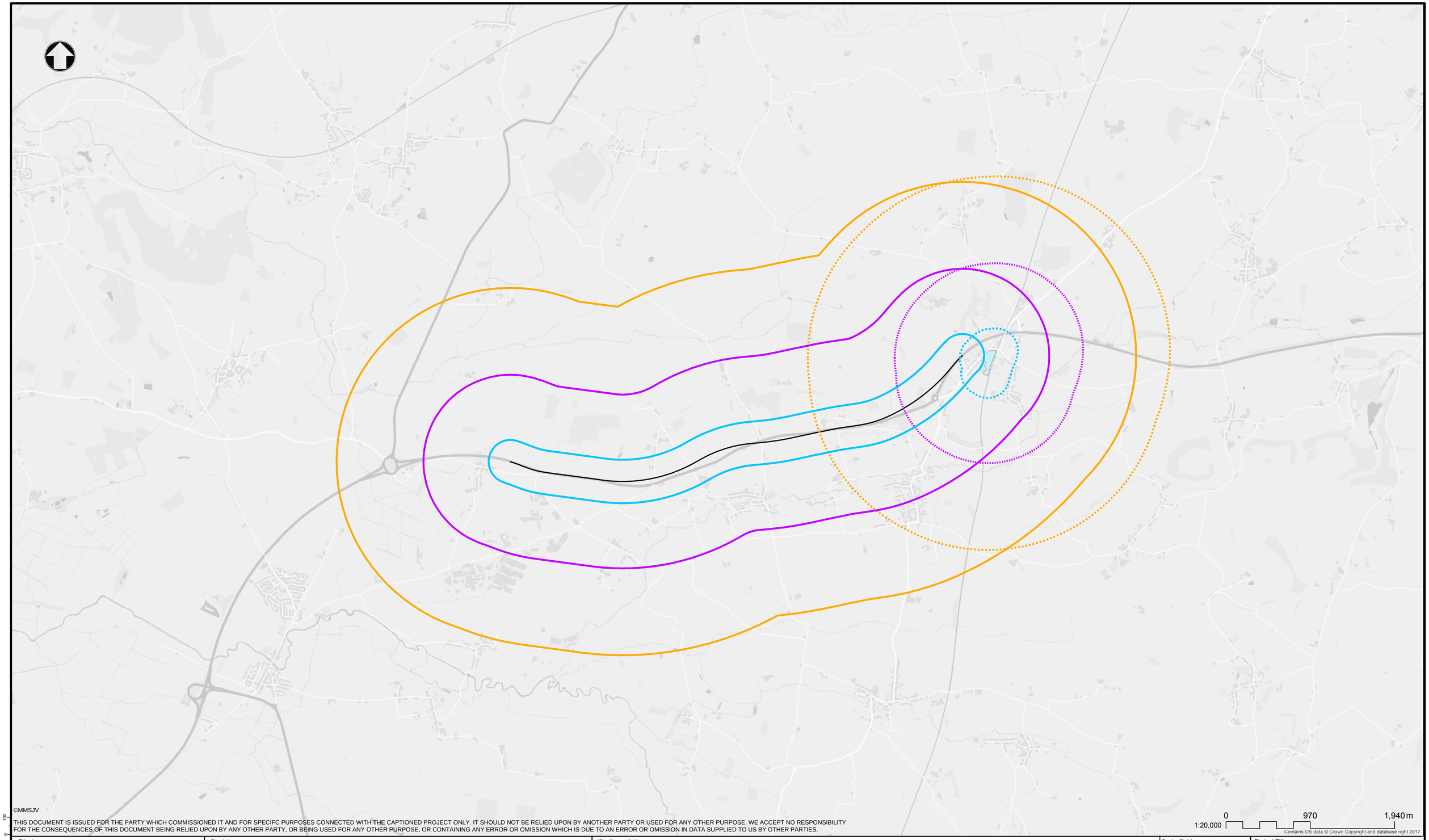
Scale @ A1:

Project Title

A303 SPARKFORD TO ILCHESTER DUALLING

Drawing Title

LOCATION OF PROPOSED DEVELOPMENT LAND NORTH OF TROUBRIDGE PARK (15.00024.OUT) IN RELATION TO THE SCHEME



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Key to symbols

SCHEME CENTRELINE

250M ZONE OF INFLUENCE

GEOLOGY AND SOILS, PEOPLE AND COMMUNITIES

1KM ZONE OF INFLUENCE

LANDSCAPE, CULTURAL HERITAGE, ROAD DRAINAGE AND WATER ENVIRONMENT

2KM ZONE OF INFLUENCE

BIODIVERSITY

FORMER HAYNES PUBLISHING SITE (16.00725.OUT)

250M ZONE OF INFLUENCE

GEOLOGY AND SOILS, PEOPLE AND COMMUNITIES

1KM ZONE OF INFLUENCE

LANDSCAPE, CULTURAL HERITAGE, ROAD DRAINAGE AND WATER ENVIRONMENT

2KM ZONE OF INFLUENCE

BIODIVERSITY

Scale @ A1:

Project Title

A303 SPARKFORD TO ILCHESTER DUALLING

Drawing Title

LOCATION OF PROPOSED DEVELOPMENT FORMER HAYNES PUBLISHING SITE (16.00725.OUT) IN RELATION TO THE SCHEME

Appendix E.3 – Combined effects assessment tables

Table E.3.1: Combined Residual Construction Phase Effects

Receptor	Topic area									
	Air Quality	**Cultural Heritage**	**Landscape**	**Biodiversity**	**Geology and Soils**	**Materials**	**Noise and Vibration**	**People and Communities**	**Climate Change**	**Significance of Combined Effects**
Geology and Soils	-	-	-		Slight Adverse	-	-			Not Significant Adverse
Landscape / Townscape	-	Significant Adverse	Significant Adverse	Slight Adverse	-		-			Significant Adverse
Cultural Features	-	Significant Adverse	Significant Adverse	-	-		-			Significant Adverse
Communities	Not Significant Adverse	-	Significant Adverse	-			Not Significant Adverse	Slight Adverse		Not Significant Adverse
Vehicle Travellers	-	-	-	-	-		-	Moderate Adverse		Significant Adverse
Water Environment	-	-	-	Slight Adverse	Slight Adverse		-			Not Significant Adverse
Ecology	Not Significant Adverse	-	-	Slight Adverse			-			Not Significant Adverse
Material resources	-	-	-		Slight Adverse	Potentially Significant Adverse	-			Significant Adverse
Climate									Slight Adverse**	Not Significant Adverse
Human Health and Wellbeing	Not Significant Adverse				Slight Adverse		Not Significant Adverse	Slight Adverse		Not Significant Adverse
Overall significance of combined effects during construction (on balance)										**Not Significant Adverse**

* For Chapter 12 People and Communities, effects assessed for driver stress are included within the receptor 'vehicle travellers' row, effects assessed for agricultural land are included within the receptor 'geology and soils' row, and effects assessed for Non-Motorised Users, Amenity, Severance, Individual Farm Businesses, Demolition of Private Property, Land Take, and Motorised travellers view from the road are included within the receptor 'communities' row.

** For Chapter 14 Climate Change, effects assessed for the receptor 'climate' only refer to effects on climate, and do not take into consideration the scheme's vulnerability to climate change.

Table E.3.2: Combined Residual Operation Phase Effects

Receptor	Topic Area									
	Air Quality	**Cultural Heritage**	**Landscape**	**Biodiversity**	**Geology and Soils**	**Materials**	**Noise and Vibration**	**People and Communities**	**Climate Change**	**Significance of Combined Effects**
Geology and Soils	-	-	-		Not assessed during operation	Not assessed during operation	-			Neutral
Landscape / Townscape	-	Slight Adverse	Slight Adverse (at Year 15)	Neutral	Not assessed during operation	Not assessed during operation	-			Not Significant Adverse
Cultural Features	-	Slight Adverse	Slight Adverse (at Year 15)	-	Not assessed during operation	Not assessed during operation	-			Not Significant Adverse
Communities	Not Significant Adverse	-	Slight Adverse (at Year 15)	-	Not assessed during operation	Not assessed during operation	Not Significant Adverse	Slight Adverse		Not Significant Adverse
Vehicle Travellers	-	-	-	-	Not assessed during operation	Not assessed during operation	-	Slight Beneficial		Not Significant Adverse
Water Environment	-	-	-	Neutral	Not assessed during operation	Not assessed during operation	-			Neutral
Ecology	Potential for Significant Adverse Effects	-	-	Neutral	Not assessed during operation	Not assessed during operation	-			Not Significant Adverse
Material resources	-	-	-		Not assessed during operation	Not assessed during operation	-			Neutral
Climate									No effects**	Neutral
Human Health and Wellbeing	Not Significant				Not assessed during operation	Not assessed during operation	Potential for Significant Adverse Effects**	Slight Adverse		Not Significant Adverse
Overall significance of combined effects during operation (on balance)										**Not Significant Adverse**

* For Chapter 12 People and Communities, effects assessed for driver stress are included within the receptor 'vehicle travellers' row, effects assessed for agricultural land are included within the receptor 'geology and soils' row, and effects assessed for Non-Motorised Users, Amenity, Severance, Individual Farm Businesses, Demolition of Private Property, Land Take, and Motorised travellers view from the road are included within the receptor 'communities' row.

** For Chapter 14 Climate Change, effects assessed for the receptor 'climate' only refer to effects on climate, and do not take into consideration the scheme's vulnerability to climate change.

Appendix E.4 – Cumulative effects assessment table

ID	Tier	Application Reference	Assessment of Cumulative Effects	Need for Additional Mitigation
Cultural Heritage The effects on Cultural Heritage as a result of the scheme have been assessed in Chapter 6 Cultural Heritage. The residual on-balance effects on cultural heritage are as follows: *Construction: Significant Adverse (buried archaeology and heritage assets)* *Operation: Significant Adverse (buried archaeology and heritage assets)*				
10	1	Former Haynes Publishing Site 16/00725/OUT	<u>Former Haynes Publishing Site Residual Effects</u> No assessment has been undertaken for effects on Cultural Heritage as a result of Former Haynes Publishing Site, and as such, effects are assumed to be Neutral. **Construction** Neutral **Operation** Neutral	**Construction:** No additional mitigation on top of the individual mitigation specified is considered necessary, as no Significant Adverse cumulative effects are predicted. **Operation:** No additional mitigation on top of the individual mitigation specified is considered necessary, as no Significant Adverse cumulative effects are predicted.
			<u>Cumulative Residual Effects for Former Haynes Publishing Site and the scheme</u> Due to the close proximity of the Former Haynes Publishing Site with the scheme, the 1km ZOI for both construction and operation overlap covers the eastern tip of the scheme, as shown in drawing HE551507-MMSJV-EGN-000-DR-LP-0002 (Appendix E.2). As Neutral effects are anticipated on both buried archaeology and heritage assets as a result of this other development, cumulative effects are not anticipated to be any greater with the proposed scheme, during both construction and operation. Due to the existing A303 forming a barrier between this proposed other development and Hazlegrove Registered Park and Garden, which is located within the ZOI overlap, it is not anticipated that construction or operational impacts associated with the development of the Former Haynes Publishing Site would have any additional cumulative effects on top of the scheme. **Construction** Significant Adverse (buried archaeology and heritage assets) **Operation** Not Significant Adverse (heritage assets)	
Landscape The effects on landscape as a result of the scheme have been assessed in Chapter 7 Landscape. The residual effects on landscape are as follows: *Construction: Significant Adverse (Landscape Character), Significant Adverse Effects (Visual Effects)* *Operation: Slight Adverse (Landscape Character), Slight Adverse (Visual Effects)*				
10	1	Former Haynes Publishing Site 16/00725/OUT	<u>Former Haynes Publishing Site Residual Effects</u> No assessment has been undertaken for effects on Landscape and Visual Effects as a result of Former Haynes Publishing Site, and as such, effects are assumed to be Neutral. **Construction** Neutral **Operation** Neutral	**Construction:** No additional mitigation on top of the individual mitigation specified is considered necessary, as no Significant Adverse cumulative effects are predicted. **Operation:** No additional mitigation on top of the individual mitigation specified is considered necessary, as no Significant Adverse cumulative effects are predicted.
			<u>Cumulative Residual Effects for Former Haynes Publishing Site and the scheme</u> Due to the close proximity of the Former Haynes Publishing Site with the scheme, the 1km ZOI for both construction and operation overlap covers the eastern tip of the scheme, as shown in drawing HE551507-MMSJV-EGN-000-DR-LP-0002 (Appendix E.2). As Neutral effects are anticipated on both landscape character and visual effects as a result of this other development, cumulative effects are not anticipated to be any greater with the proposed scheme, during both construction and operation. **Construction** Significant Adverse (Landscape Character), Significant Adverse Effects (Visual Effects) **Operation** Slight Adverse (Landscape Character), Slight Adverse (Visual Effects)	
Biodiversity The effects on biodiversity as a result of the scheme have been assessed in Chapter 8 Biodiversity. The residual effects on biodiversity are as follows: *Construction: Slight Adverse* *Operation: Slight Adverse, reducing to Neutral over time*				
10	1	Former Haynes Publishing Site 16/00725/OUT	<u>Former Haynes Publishing Site Residual Effects</u> An Ecological Appraisal was produced by Crossman Associates (2016) which concluded that habitats within the site are limited, and is considered to have ecological value at a local level. The site is likely to support nesting birds and small numbers of reptiles, and there is a possible bat roost in one of the buildings, however mitigation has been proposed to mitigate any adverse effects. The planting proposals aim to maintain and enhance the site's component value to bats as well as other wildlife. The residual effects as a result of Former Haynes Publishing Site are therefore assumed to be: **Construction**	**Construction:** No additional mitigation on top of the individual mitigation specified is considered necessary, as no Significant Adverse cumulative effects are predicted. **Operation:** No additional mitigation on top of the individual mitigation specified is considered necessary, as no Significant Adverse cumulative effects are predicted.

ID	Tier	Application Reference	Assessment of Cumulative Effects	Need for Additional Mitigation
			Neutral **Operation** Slight Beneficial	
			<u>Cumulative Residual Effects for Former Haynes Publishing Site and the scheme</u> Due to the close proximity of the Former Haynes Publishing Site with the scheme, the 2km ZOI for both construction and operation overlap covers the eastern tip of the scheme, as shown in drawing HE551507-MMSJV-EGN-000-DR-LP-0002 (Appendix E.2). With best practice mitigation measures employed for this proposed development, and that detailed for the scheme, it is anticipated this this proposed development would not result in any additional cumulative effects as a result, for both construction and operational phases. **Construction** Slight Adverse **Operation** Slight Adverse, reducing to Neutral over time	
14	1	Land North of Troubridge Park 15/00024/OUT	<u>Land North of Troubridge Park Residual Effects</u> An Ecological Walkover Survey was undertaken by County Contracts in 2014, which identified the potential presence of suitable habitat to support protected species on-site, however no assessment has been made regarding the effects of the development on biodiversity. The Ecological Walkover Survey made several recommendations for mitigation. Therefore, as no impact assessment has been carried out the residual effects as a result of Land North of Troubridge Park are assumed to be: **Construction** Neutral **Operation** Neutral	**Construction:** No additional mitigation on top of the individual mitigation specified is considered necessary, as no Significant Adverse cumulative effects are predicted. **Operation:** No additional mitigation on top of the individual mitigation specified is considered necessary, as no Significant Adverse cumulative effects are predicted.
			<u>Cumulative Residual Effects for Land North of Troubridge Park and the scheme</u> The 2km ZOI overlap is shown on drawing HE551507-MMSJV-EGN-000-DR-LP-0006 (Appendix E.2). Given the neutral effects anticipated as a result of the proposed development, and with best practice mitigation measures to be employed for both the proposed development and the scheme, there are not anticipated to be any additional cumulative effects to biodiversity. **Construction** Slight Adverse **Operation** Slight Adverse, reducing to Neutral over time	
Geology and Soils The effects on geology and soils as a result of the scheme have been assessed in Chapter 9 Geology and Soils. The residual effects on geology and soils are as follows: *Construction: Slight Adverse* *Operation: Not assessed*				
10	1	Former Haynes Publishing Site 16/00725/OUT	<u>Former Haynes Publishing Site Residual Effects</u> The residual effects during construction and operation on Geology and Soils have been taken from the Preliminary Geo-Environmental and Geotechnical Assessment produced by Tweedie Evans Consulting (2016). The residual effects as a result of Former Haynes Publishing Site are as follows: **Construction** Slight Adverse **Operation** Neutral	**Construction:** No additional mitigation on top of the individual mitigation specified is considered necessary, as no Significant Adverse cumulative effects are predicted. **Operation:** No additional mitigation on top of the individual mitigation specified is considered necessary, as no Significant Adverse cumulative effects are predicted.
			<u>Cumulative Residual Effects for Former Haynes Publishing Site and the scheme</u> The 250km ZOI overlap between the Scheme and this proposed development is shown in drawing HE551507-MMSJV-EGN-000-DR-LP-0002 (Appendix E.2). Given the close proximity of this proposed development with the scheme, and the close proximity of the historic landfill 'Land Adjacent to Hazlegrove Park', there is the potential for cumulative effects during construction. However, with best practice mitigation measures in place, it is not anticipated that cumulative effects would become Significant during construction. **Construction** Slight Adverse **Operation** Neutral	
Materials The effects on materials as a result of the scheme have been assessed in Chapter 10 Materials. The residual effects on materials are as follows:				

ID	Tier	Application Reference	Assessment of Cumulative Effects	Need for Additional Mitigation
Construction: Potentially Significant Adverse (material use), Not Significant (waste) *Operation:* Not Assessed				
Due to the study area for materials assessing the effects purely within the Scheme footprint, no cumulative assessment has been made as the scheme footprint does not overlap with any of the 'other development' footprints.				
People and Communities The effects on people and communities as a result of the scheme have been assessed in Chapter 12 People and Communities. The residual effects on people and communities are as follows: *Construction: Slight Adverse* *Operation: Slight Adverse*				
10	1	Former Haynes Publishing Site 16/00725/OUT	<u>Former Haynes Publishing Site Residual Effects</u> No assessment has been undertaken for effects on People and Communities as a result of Former Haynes Publishing Site, and as such, effects are assumed to be Neutral. Best practice mitigation in the form of appropriate signage and a Traffic Management Plan will be employed for this proposed development. **Construction** Neutral **Operation** Neutral <u>Cumulative Residual Effects for Former Haynes Publishing Site and the scheme</u> The 250km ZOI overlap between the scheme and this proposed development is shown in drawing HE551507-MMSJV-EGN-000-DR-LP-0002 (Appendix E.2). Given the effects on People and Communities as a result of this proposed development are Neutral, and with best practice mitigation measures employed for both this proposed development and the Scheme, it is not anticipated that there would be any cumulative effects associated with this proposed development. **Construction** Slight Adverse **Operation** Slight Adverse	**Construction:** No additional mitigation on top of the individual mitigation specified is considered necessary, as no Significant Adverse cumulative effects are predicted. **Operation:** No additional mitigation on top of the individual mitigation specified is considered necessary, as no Significant Adverse cumulative effects are predicted.

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