Lower Thames Crossing

7.11 Sustainability Statement

APFP Regulation 5(2)(q)

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Lower Thames Crossing

7.11 Sustainability Statement

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1 Executive summary

1.1.1 This Sustainability Statement (Application Document 7.11) has been prepared by National Highways ('the Applicant') to support the Development Consent Order (DCO) Application for the A122 Lower Thames Crossing ('the Project').

1.1.2 Achieving sustainable development concerns the balanced consideration of environment, social and economic objectives – the three pillars of sustainability. The overarching purpose of this Sustainability Statement is to provide a response to a broad spectrum of goals of sustainable development as outlined in Design Manual for Roads and Bridges (DMRB) which spans all three 'pillars of sustainability'. This Statement explains the Project's response to the goals for sustainable development raised under each of the headings in DMRB GG 103: Introduction and General Requirements for Sustainable Development and Design (Highways England, 2019a).

1.1.3 Section E/1 of DMRB GG 103 describes a detailed series of recommendations for sustainable design. This Sustainability Statement is a response to these recommendations. Sections 4 to 15 detail in turn how the Project has approached sustainability throughout the design.

1.1.4 A summary of the responses provided within the Sustainability Statement to each requirement of DMRB GG 103 is provided in Table 1.1 below.

Table 1.1 The Project's responses to DMRB GG 103 (Highways England, 2019a)

Sustainability requirement	The Project's response
Improve the health, safety and wellbeing of those affected by road infrastructure	
E/1.3: The achievement of safety shall be the primary concern of all design.	The Project has incorporated principles outlined within the Home Safe and Well strategy (Highways England 2019a) in the design. This strategy, together with General Principles of Prevention (Health & Safety Executive (HSE), 2015) ensures that safety is the primary imperative of design decisions. The design process looked at practicable design interventions to eliminate and mitigate risk throughout the whole life cycle of the Project, from construction through to operation and maintenance, safeguarding future road users and the highways workforce.
E1.4: Design shall identify and respond to any adverse effects on health, safety and wellbeing from projects.	A Design Risk Management Tool has been used during the design of the Project which ensures the design considers both health and safety issues. An additional health hazard risk assessment has been developed to ensure human factors and health hazards are considered during key construction activities.
E/1.5: Measures appropriate to safeguard the resilience of the network from sources of flood risk shall be identified, assessed and incorporated into design.	The risk of flood has been extensively reviewed and addressed in the design to develop effective drainage and water management throughout the Project, considering the likely impacts of climate change.
E/1.6: Opportunities to include Sustainable Urban Drainage Systems (SuDS) shall, where relevant, be incorporated into design.	The drainage design incorporates SuDS and reduces the risk of causing flooding elsewhere through the utilisation of attenuation features as presented on Figure 2.4 Environmental Masterplan (Application Document 6.2).
E/1.7: Measures to manage noise shall be enacted in accordance with the Noise Policy Statement for England (Department for Environment, Food and Rural Affairs (Defra), 2010).	Some level of impact as a result of the noise associated with the Project is anticipated for certain receptors. To keep these impacts to a minimum, a series of best practice measures have been incorporated into the Register of Environmental Actions and Commitments (REAC) (Appendix 2.2: CoCP, Application Document 6.3).

Sustainability requirement	The Project's response
Improve land, water and air quality	
E/1.8: Opportunities to prevent future land contamination and to remediate current land contamination shall be identified, assessed and incorporated into design.	Land contamination issues have been assessed within the ground investigations undertaken for the Project. If contaminated land is disturbed during construction, contamination would be controlled in accordance with good practice to minimise risks to construction workers or the wider environment (control measures are outlined within the REAC). Moreover, the design of the new road drainage system means that any contamination arising on the Project from road spillage would be intercepted so that it minimises soil or groundwater contamination.
E/1.9 Opportunities to preserve and improve the quality of surface and groundwater and reduce water consumption shall be identified, assessed and incorporated into design.	The design of the Project has been prepared to ensure that discharges from the carriageway would not lead to deterioration in the Water Framework Directive's (UK Statutory Instruments, 2017) objectives and classification status of receiving watercourses. The design of the drainage system with spillage control, natural attenuation and treatment of discharges and ultimately soakaways to groundwater would minimise the potential for contamination of groundwater. Water use efficiency and leakage reduction measures would be adopted during the construction phase.
E/1.10: Opportunities to achieve air quality improvements from construction, use and decommissioning shall be identified, assessed and incorporated into the design.	The Project has been aligned to avoid highly populated communities so far as practicable. The Project is considered to have a significant effect on designated habitats for ecology because of an increase in nitrogen deposition, measures designed to mitigate and compensate for adverse effects on designated habitats are detailed in the Project Air Quality Plan (Appendix 5.6, Application Document 6.3).
Serve to support a sustainable economy	
E/1.11 Measures that support local, regional or national economic objectives shall be identified and, where relevant, incorporated into design.	The Project is anticipated to contribute to local, regional and national economic objectives via improvements in connectivity. This is likely to result in stronger north-south business relationships and higher commuter flows as workers move to more productive, and thus higher-paying jobs.
E/1.12 Opportunities to reduce disturbance effects on local economies shall be identified and, where relevant, incorporated into design.	During operation, the Project would have positive local economic impacts, reducing existing severance for businesses, bringing businesses closer together without any changes in their physical location. This increased business proximity to suppliers and customers yields knowledge and technology synergies and allows the creation of deeper business and labour markets.

Sustainability requirement	The Project's response
Represent good 'whole life' value across the design life of road infrastructure	
E/1.13: Whole life costing shall be used to inform all design decisions, particularly when demonstrating the pay back periods for, and cost benefits of, innovations.	The Project has developed a baseline Whole Life Cost Model (as outlined within the Economic Appraisal Report (Appendix D, Application Document 7.7)). The Contractors would demonstrate their assessment of whole life value, based on their detailed design, in submission of their Whole Life Costs Model, Asset Management Forward Plan and Whole Life Carbon Model, as part of the tender submission pack.
E/1.14: Measures to reduce the need for maintenance, repair, refurbishment, and replacement to increase design life shall be identified and, where feasible, incorporated into the design.	
Embrace Innovation	
E/1.15 Innovations (design, technology, practice, behaviour, other) that deliver enhanced sustainable development outcomes shall, where relevant, be identified, and subject to necessary approvals required by National Highways, incorporated into the design.	Innovation was considered during the preliminary design phase and will continue to be incorporated where possible during detailed design.
Reduce inequalities and ensure access to all	
E/1.16: Adjustments to any aspect of design that address the needs of users and stakeholders with protected	The Project has engaged with several road user groups to ensure the needs of all are incorporated into all aspects of the design of the Project. This engagement, alongside best practice guidance, have influenced the design of the Project to ensure it is inclusive/accessible for all.

Sustainability requirement	The Project's response
characteristics that are covered by the Equality Act 2010, or who are affected by socio-economic disadvantage, shall be identified, assessed and incorporated into the design.	
E/1.17 Where opportunities arise designs shall seek to foster good relations between people with protected characteristics and those without protected characteristics.	
E/1.18 Where it is safe to do so opportunities to improve accessibility for all network users shall be identified, assessed and incorporated into the design.	The works required to construct the Project would affect routes used by walkers, cyclists and horse riders. In most cases the construction of new permanent diversions would carry the Public Rights of Way safely passed the works. Walkers, cyclists and horse riders may also be affected by changes in traffic levels, due in particular to Project construction traffic. Locations where routes would be temporarily diverted, realigned or closed to accommodate the construction of the Project are shown in Appendix A of the Transport Assessment (Application Document 7.9). The Contractors would have to engage with the public and stakeholders over potential closures of footpaths, cycleways and bridleways, and signpost these clearly in consultation with the local highways authority and use social media to update the public in real time, of closures and diversions. The Health and Equalities Impact Assessment (Application Document 7.10) found that during the operational phase, the Project would be expected to have a neutral impact on access by private vehicle to a number of important socio-economic destinations.
Use responsibly sourced materials that minimise adverse impacts on people and their environment	
E/1.19: Designs shall not restrict the use of materials with proven sustainability credentials.	A commitment is made within the REAC (Appendix 2.2: CoCP, Application Document 6.3) to ensure the Contractors would use the BRE Framework Standard for Responsible Sourcing (BES 6001) (British Standards Institution, 2014). Contractors are also required to investigate opportunities to standardise construction aspects and use prefabricated structures and components.

Sustainability requirement	The Project's response
Be resource efficient and reflect a circular approach to the use of materials	
E/1.20: Design solutions shall seek to minimise the consumption of materials and the generation of waste.	The design of the Project has pursued the objective of designing-out material consumption. Materials have been selected with a consideration of the desirability of a long design life. To further reduce the demand for primary resources, the construction Contractors would be set a target of at least 31% for the importation of aggregate from recycled or secondary sources, as long as engineering specifications permit this. The Contractors are expected to reuse a minimum of 70% of site-won materials. The vegetation cleared for the route and construction compounds would be recovered to produce a material suitable for ecological mitigation purposes. Where inert excavated material and inert construction waste cannot be used on site, the Contractors would ensure a minimum of 95% of inert construction, demolition and excavation waste destined for offsite waste management outside the Order Limits, would be diverted from final disposal to landfill.
E/1.21: Safe design solutions that enable deconstruction, demounting and decommissioning to facilitate future high value recycling, re-manufacture or re-use at end of first life, shall be identified and where feasible incorporated into design.	The tunnel and main structures of the Project have been designed for a working life of in excess of 120 years. After this time structural health monitoring will determine the need to retain, refit or refurbish the structure and ensure that its integrity is maintained.
Minimise greenhouse gas emissions	
E/1.22: Carbon emissions (greenhouse gases or carbon dioxide equivalents) associated with the whole life of a project shall be minimised.	The Project has quantified its emissions across the construction and operational phases, following the principles of PAS 2080 (British Standards Institution, 2016), outlined in the Carbon and Energy Management Plan (Application Document 7.19). The Project has committed to a best practice carbon management approach.

Sustainability requirement	The Project's response
Be resilient to future climate change	
E/1.23: Resilience to future climatic conditions specific to the local and surrounding area shall be identified, assessed and incorporated into the design.	Potential climactic conditions specific to the local and surrounding area that could occur in the future have been identified and subsequently assessed within ES Chapter 15: Climate (Application Document 6.3). Extensive mitigation has been outlined and incorporated into the design of the Project.
Protect, and where possible enhance, the surrounding environmental and cultural context	
E/1.24: The design shall work in sympathy with, and seek to enhance, the surrounding natural, built and historic environment.	The surrounding environment has been a key driver in developing the design, ensuring that, where practicable, significant structures sit contextually and sympathetically within the surrounding landscape and historic environment. The architecture and landscape design proposals have been developed in conjunction with independent design reviews by National Highways Strategic Design Panel, administered by the Design Council Commission for Architecture and the Built Environment.
E/1.25: When designing a project there shall be no net loss of biodiversity.	An iterative appraisal of the Project design considering the design principles and good practice was undertaken to identify any potentially significant effects to biodiversity that would require essential mitigation. The route corridor has been designed to be a biodiverse wildlife corridor connecting suitable habitats throughout the wider landscape. Biodiversity metric calculations have been undertaken; these concluded that the Project would have a biodiversity net gain of 7%.
E/1.26: Design shall seek to limit the impact of light pollution resulting from the road network.	The areas that have been identified as requiring lighting were assessed using the criteria in BS 5489 (British Standards Institution, 2020), and European Technical Report EN 13201 - Road lighting (European Standards, 2015) to establish a lighting class. The Institution of Lighting Professionals' (2020) Guidance Notes on the Reduction of Light Pollution – Guidance Note 01/20 classifies areas into Environmental Zones based on the ambient 'artificial' lighting level. This guidance was used to assess the Project route. LEDs are the only light source considered for new lighting designs.

Sustainability requirement	The Project's response
Be shaped by the opinions of communities and road users	
E/1.27: Stakeholders shall be engaged to help shape the approach to sustainable development incorporated into the design.	The impact on communities, the surrounding environment and the local economy has been at the centre of the stakeholder engagement programme. Stakeholder responses have been important in developing and refining the design of the Project so it has a better impact on the communities, the surrounding environment and the local economy; and therefore, is more sustainable.
E/1.28: Stakeholder engagement shall appropriately reflect the diversity of the area in which a project is to be delivered.	To ensure that stakeholder engagement reflected the diversity of the area and the needs of those with protected characteristics, specific provisions were included in the plans for stakeholder engagement (see the Consultation Report, Application Document 5.1). Activities were carried out to ensure that in addition to the main statutory and non-statutory consultations, engagement reflected the diversity of the area and addressed those with protected characteristics.
E/1.29: Stakeholder engagement shall involve people with protected characteristics who may be affected by designs.	

2 Introduction

2.1.1 This Sustainability Statement has been prepared as part of the application for a Development Consent Order (DCO) for the A122 Lower Thames Crossing (the Project). It is not a statutory requirement, but the Applicant considers social, environmental and economic sustainability to be important. Without the statutory requirement, it was necessary to develop a comprehensive approach; it is considered that Design Manual for Roads and Bridges (DMRB) GG 103 (Highways England, 2019a) provides a framework because it outlines how highways can deliver sustainability benefits. Therefore, this Sustainability Statement is a response to the elements of sustainable road design set out in E/1 of DMRB GG 103. To inform the response, this Statement draws upon Project descriptive material – namely, the principal assessment findings reported in the Environmental Statement (ES) (Application Documents 6.1) and the Economic Appraisal Report (Application Document 7.7, Appendix D); this Statement should therefore be read in conjunction with these documents. The Register of Environmental Actions and Commitments (REAC), which is part of ES Appendix 2.2: Code of Construction Practice (CoCP) (Application Document 6.3) will also be referred to within this statement. When referring to commitments made by the Project in the REAC, the commitment's alphanumerical code will appear within [square brackets]. This Statement also draws on other documents within the DCO application and cross-references are included to signpost the reader to where further detail or information can be found.

2.1.2 This introduction contains the following:

a. A project description

b. A sustainability overview

c. The purpose of this Statement

d. An outline of the content of subsequent sections in this Statement

2.2 Project description

2.2.1 The Project would provide a connection between the A2 and M2 in Kent and the M25 south of junction 29, crossing under the River Thames through a tunnel. The Project route is presented in Plate 2.1 and a full Project Description is provided in ES Chapter 2: The Project (Application Document 6.1).

2.2.2 The A122 would be approximately 23km long, 4.25km of which would be in tunnel. On the south side of the River Thames, the Project route would link the tunnel to the A2 and M2. On the north side, it would link to the A13, M25 junction 29 and the M25 south of junction 29. The tunnel entrances would be located to the east of the village of Chalk on the south of the River Thames and to the west of East Tilbury on the north side.

2.2.3 Junctions are proposed at the following locations:

a. New junction with the A2 to the south-east of Gravesend

b. Modified junction with the A13/A1089 in Thurrock

c. New junction with the M25 between junctions 29 and 30

2.2.4 The Project route would be three lanes in both directions, except for:

a. link roads

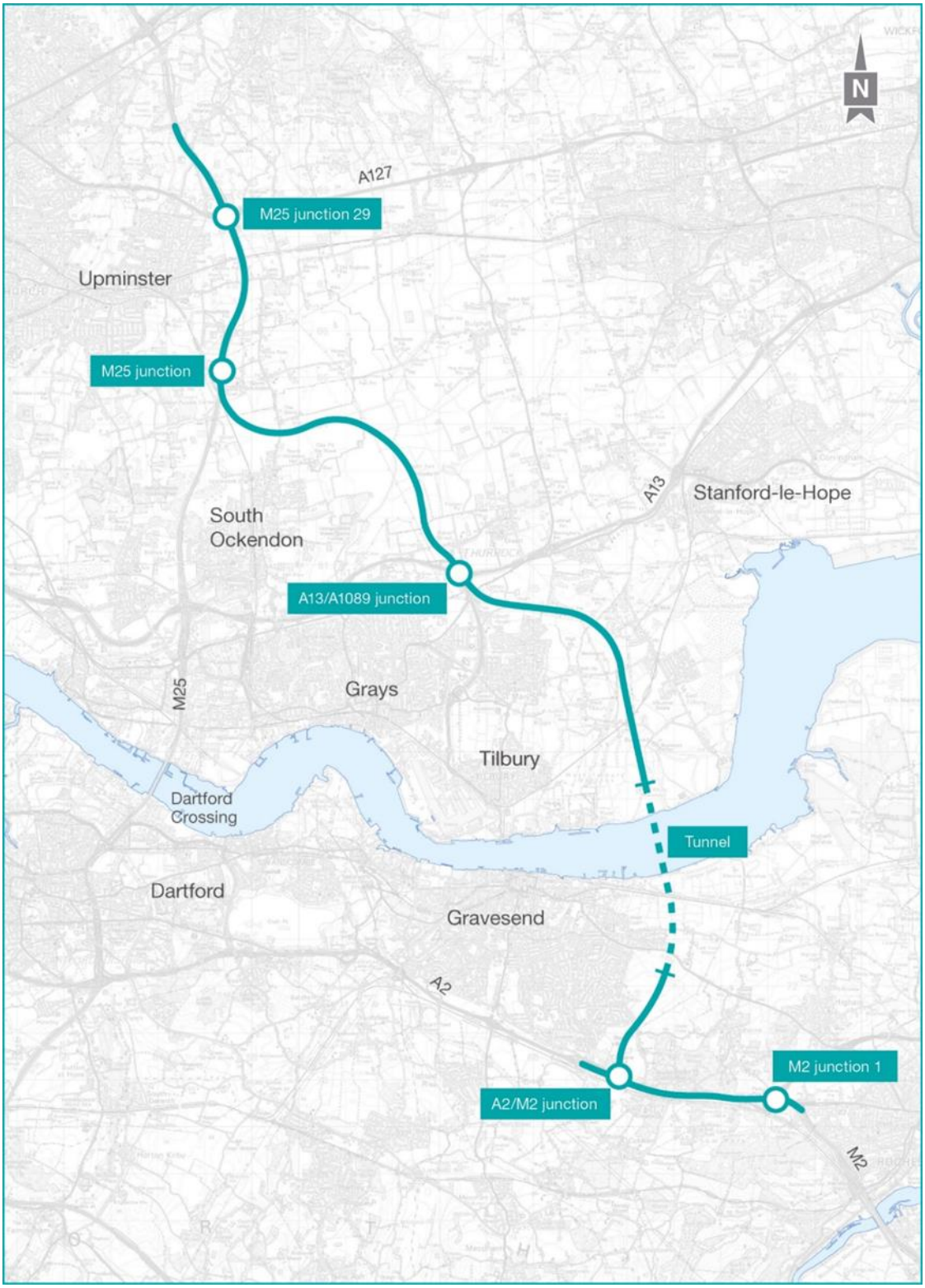
b. stretches of the carriageway through junctions

c. the southbound carriageway from the M25 to the junction with the A13/A1089, which would be two lanes.

2.2.5 In common with most A-roads, the A122 would operate with no hard shoulder but would feature a 1m hard strip on either side of the carriageway. It would also feature technology including stopped vehicle and incident detection, lane control, variable speed limits and electronic signage and signalling. The A122 design outside the tunnel would include emergency areas. The tunnel would include a range of enhanced systems and response measures instead of emergency areas.

2.2.6 The A122 would be classified as an ‘all-purpose trunk road’ with green signs. For safety reasons, walkers, cyclists, horse riders and slow-moving vehicles would be prohibited from using it.

Plate 2.1 Lower Thames Crossing route



2.3 Sustainability overview

2.3.1 The Project is the largest road construction project planned in England and Wales since the M25 motorway around London. When such a large construction project is undertaken, there is a need to consider how to make the Project as sustainable as practicable. In the report The Road to Growth

(Highways England, 2017a), the Applicant refers to independent research that has identified four strategic economic roles for the strategic road network (SRN). These are as follows:

a. 'Supporting business productivity and competitiveness, and enabling the performance of SRN-reliant sectors

b. Providing efficient routes to global markets through international gateways

c. Stimulating and supporting the sustainable development of homes and employment spaces

d. Providing employment, skills and business opportunities within our sector.'

2.3.2 The benefits arising from the Project are anticipated to include a positive economic impact and a reduction in traffic congestion at the existing Dartford Crossing as set out in the 'Need for the Project' (Application Document 7.1). This Sustainability Statement examines in more detail how this is to be achieved and what sustainable solutions will be provided to minimise harm to the environment and communities. This Sustainability Statement summarises the main areas where sustainability has been incorporated in the Project.

2.4 Purpose of this statement

2.4.1 As outlined in Paragraph 2.1.1, this Sustainability Statement is not a statutory requirement but the Applicant aims to enhance, where practicable, the social, environmental and economic sustainability of the Project . National Highways' licence to operate (Department for Transport (DfT), 2015) states that 'the Licence holder must, in exercising its functions and complying with its legal duties and other obligations, act in a manner which it considers best calculated to: [inter alia] Conform to the principles of sustainable development.'

2.4.2 The NPSNN (DfT, 2014) provides further detail for road projects. It explains that the Government chose the policies set out in the NPSNN as they strike 'the best balance between the Government's economic, environment and social objectives.'

2.4.3 The National Planning Policy Framework (Ministry of Housing, Communities & Local Government, 2021), states that 'The purpose of the planning system is to contribute to the achievement of sustainable development. At a very high level, the objective of sustainable development can be summarised as meeting the needs of the present without compromising the ability of future generations to meet their own needs.'

2.4.4 Published in July 2019 by the Applicant as part of DMRB, the document titled GG 103 Introduction and general requirements for sustainable development and design (Highways England, 2019a), sets out the Applicant's requirements for sustainable development and design.

2.4.5 DMRB GG 103 (Highways England, 2019a) defines sustainable development as 'encouraging economic growth while protecting the environment and improving safety and quality of life for current and future generations'.

2.4.6 This Sustainability Statement is a response to the elements of sustainable road design set out in Section E/1 of DMRB GG 103.

2.4.7 DMRB GG 103 also states that 'design has a fundamental role to play in achieving sustainable development. Decisions made by the designer will affect the economy, the environment and society both now and in the future.' This design theme is further covered in the Project Design Report (Application Document 7.4) and the Design Principles (Application Document 7.5).

2.5 Report structure

2.5.1 The structure of this Sustainability Statement is as follows:

a. **Section 1** – Executive summary

b. **Section 2** – Introduction – an overview of the purpose of the Sustainability Statement, its structure and a short description of the Project route.

c. **Section 3** – Legislation and policy relating to sustainability – a review of national policies, the Applicant's licence and sustainable development goals along with the requirements set for projects by the provisions of the DMRB GG 103 standard.

d. **Section 4** – Improve the health, safety and wellbeing of those affected by road infrastructure – a summary of various safety-related issues affected by the design of the Project including the health, safety and wellbeing of those affected by the Project, flood resilience, drainage issues and noise management.

e. **Section 5** – Improve land, water and air quality – a description of how the design of the Project has considered land contamination, preserving and improving the quality of surface and groundwater and minimising the consumption of groundwater. This Section also describes where air quality improvements have been identified, assessed and incorporated into the design.

f. **Section 6** – Serve to support a sustainable economy – a description of how the Project would support local, regional and economic objectives while reducing disturbance to the local economy from issues such as severance or environmental impacts.

g. **Section 7** – Represent good 'whole life' value across the design life of road infrastructure – a description of how the whole-life value has been incorporated into design decisions, analysis of pay back periods, the cost benefits of innovations and the impacts this can have on network availability from reduced maintenance.

h. **Section 8 – Embrace innovation** – examples of where design, technology or behavioural innovations have enhanced the Project's sustainable development outcomes.

i. **Section 9 – Reduce inequalities and ensure access for all** – a review of design aspects that have addressed the needs of users with protected characteristics or who are affected by socio-economic disadvantage. This Section also covers walkers, cyclists, horse riders and transport connectivity.

j. **Section 10 – Use responsibly sourced materials that minimise adverse impacts on people and the environment** – a review of National Highways' strategy for responsible sourcing and how this is addressed in the design.

k. **Section 11 – Be resource efficient and reflect a circular approach to the use of materials** – an explanation of where the design promotes material reuse and minimising waste and where this would be encouraged during construction.

l. **Section 12 – Minimise greenhouse gas emissions** – a description of how the Project is tackling the challenge of reducing greenhouse gas emissions from the construction and operation of the Project.

m. **Section 13 – Be resilient to future climate change** – this details the attention paid to climate change resilience during design.

n. **Section 14 – Protect and where possible enhance, the surrounding environmental and cultural context** – an outline of the design and how it has considered the surrounding natural, built and historic environment as well as where it promotes biodiversity and avoids light pollution.

o. **Section 15 – Be shaped by the opinions of communities and road users** – a summary of discussions with stakeholders that have shaped the approach taken to sustainability on the Project.

p. **Section 16** – Concluding statement

3 Legislation and policy relating to sustainability

3.1 Legislation

3.1.1 The Project is subject to a full Environmental Impact Assessment (EIA) (Application Documents 6.1, 6.2 and 6.3) in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 and reference will be made to the details of the EIA in this Sustainability Statement.

3.1.2 Other national legislation relevant to this Sustainability Statement is set out in Table 3.1 below. These have been included in this Section to demonstrate the importance of sustainability in planning legislation, planning guidance and policy making. These inform the Applicant's own internal processes for delivering sustainable road design through the goals set out in DMRB GG103.

Table 3.1 Legislation relevant to sustainability

Description of relevant legislation
The Planning Act 2008 The Planning Act 2008 sets out the consenting regime for Nationally Significant Infrastructure Projects (NSIPs), which are essential to the long-term prosperity and sustainability of the country. Part 2 of the Planning Act 2008 refers to sustainability and states that the Secretary of State should create National Policy Statements and review these and that the NPS should also be subject to an appraisal of sustainability. The Secretary of State must also do this with the objective of contributing to the achievement of sustainable development and regarding the desirability of mitigating, and adapting to, climate change and achieving good design.
The Climate Change Act 2008 The Climate Change Act 2008 sets the framework for the UK to achieve its long-term net-zero goal of reducing greenhouse gases by 80% by 2050 (from the 1990 baseline), while ensuring that steps are taken towards adapting to the impact of climate change. The Act introduced a system of carbon budgeting which constrains the total amount of emissions in a given period, and sets out a procedure for assessing the risks of the impact of climate change for the UK and a requirement on the Government to develop an adaptation programme. In 2019, the Act was amended by the (2050 Target Amendment) Order 2019 this increased the UK's commitment to a 100% reduction in emissions by 2050.
The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 These regulations transposed the requirements of the 2014 amended EIA Directive into UK law. The EIA regulations cover many aspects of interest to sustainability objectives including the impacts of climate change and greenhouse gas emissions. The Project has been subject to a full ES (Application Documents 6.1, 6.2 and 6.3) which forms part of this DCO application.

3.2 National policies

3.2.1 NSIPs are determined in accordance with the decision-making framework in the Planning Act 2008 (as amended) and relevant National Policy Statements (NPSs), as well as any other matters that are both important and relevant (which may include the National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government, 2021)).

3.2.2 The NPSNN (DfT, 2014) sets out the Government's policies to deliver NSIPs on the national road and rail networks in England. Four utilities diversions

constitute NSIPs in their own right, and therefore the Project will also be assessed against the following energy policy statements:

q. Overarching National Policy Statement for Energy (EN-1) (Department of Energy and Climate Change, 2011a)

r. National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (Department of Energy and Climate Change, 2011b)

s. National Policy Statement for Electricity Networks Infrastructure (EN-5) (Department of Energy and Climate Change, 2011c).

3.2.3 The chapters of the ES (Application Document 6.1) provide a response to the relevant clauses of the NPSNN and also take into consideration the requirements of the National Policy Statements (EN-1), (EN-4) and (EN-5). It is relevant to note within this Statement that both the NPSNN and Energy NPSs have been subject to their own appraisal of sustainability which ensures they strike *'the best balance between the Government's economic, environment and social objectives'.*

3.2.4 The purpose of the Sustainability Statement is to demonstrate compliance with the sustainable development requirements outlined in DMRB GG 103. However, individual responses to the relevant sections within the NPSNN are provided in Appendix A: National Policy Statement National Networks Accordance Table and responses to the suite of Energy NPSs can be seen in Appendix B: National Policy Statements for Energy Infrastructure Accordance Tables of the Planning Statement (Application Document 7.2).

3.3 Transport Decarbonisation Plan

3.3.1 'Decarbonising Transport: A Better, Greener Britain' (Department for Transport, 2021), herein called the Transport Decarbonisation Plan identifies the commitments and actions needed to decarbonise the UK's transport system by 2050, in line with the UK's net zero commitments. The key commitments for road transport include the following:

a. Improving infrastructure for cycling and walking to reduce GHG emissions from local car journeys

b. Modernising bus services and phasing out non-zero emission buses and coaches

c. Transitioning to a zero-emission fleet of cars, vans, motorcycles and scooters through:

   i. commitments for a zero-emission Government car fleet

   ii. investment in the charging infrastructure

   iii. investment in road signalling to improve traffic flows

d. Transitioning to a zero emissions freight and logistics sector through:

i. consulting on the phase-out date for the sale of new non-zero emission Heavy Goods Vehicles

ii. encouraging a modal shift from road freight

iii. transforming 'last mile' deliveries

e. Investing in innovation and technologies for sustainable, low carbon fuels such as hydrogen

3.3.2 The Transport Decarbonisation Plan identifies the concepts, which when delivered will reduce the carbon impact of the Project's user traffic over time.

3.3.3 The design of the Project is compliant with the needs of the Transport Department.

3.4 Noise Policy Statement for England

3.4.1 The Noise Policy Statement for England (Defra, 2010) sets out three main aims:

a. 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.

b. 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.

c. Where possible, 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.

3.5 Department for Transport inclusive mobility guide

3.5.1 Inclusive Mobility (DfT, 2021) is a guide to best practice on improving access to public transport and creating a barrier-free pedestrian environment. This Sustainability Statement sets out the Government's view of an integrated transport policy, which encompasses accessible public transport, public transport infrastructure and a barrier-free pedestrian environment.

3.6 The Green Book

3.6.1 HM Treasury's Green Book appraisal and evaluation guidance (HM Treasury, 2022) recommends that the appraisal of public sector projects and programmes should be based on a social cost benefit analysis. The overarching goal of the Green Book is to provide objective analysis to support decision-making by scrutinising the business case of the relevant policy, programme or project.

3.7 Transport Analysis Guidance (TAG)

3.7.1 TAG (DfT, 2022) provides methods for appraising many of the impacts of the Project and giving them monetary values, including those for which monetary

values can be estimated. Within the Economic Appraisal Report (Application Document 7.7, Appendix D), in combination with HM Treasury's Green Book, TAG has been utilised to appraise the economic, environmental, social benefits and costs of the Project.

3.8 National Highways' licence

3.8.1 The Applicants' licence (DfT, 2015) sets out the Secretary of State's statutory directions and guidance to confer the legislative function of a strategic highways company. National Highways is the highway authority, traffic authority and street authority for the SRN in England.

Table 3.2 Sustainability issues in the Applicants' licence

Licence conditions
Under the heading of Sustainability, the licence (DfT, 2015) states that the Applicant must conform to the principles of sustainable development and also balance a range of factors in meeting the short- and long-term needs of the Strategic Road Network (SRN), specifically: • Supporting national and local economic growth and regeneration • Protecting and improving the safety of road users and road workers • Protecting, managing and enhancing the environment • Seeking to improve the wellbeing of road users and communities affected by the network • Ensuring efficiency and value for money The licence also requires the Applicant to set up a design panel and to develop and implement strategic plans that demonstrate how it aims to support and promote sustainable development.

4 Improve the health, safety and wellbeing of those affected by road infrastructure

4.1 Safety in design

DMRB GG 103 Requirement: E/1.3 The achievement of safety shall be the primary consideration of all design.

4.1.1 The health and safety section of this Sustainability Statement summarises the way in which the Project has approached safety in design with reference to the following documents:

a. Home Safe & Well (Highways England, 2019b)

b. Design Principles (Application Document 7.5)

c. Economic Appraisal Report (Application Document 7.7, Appendix D)

4.1.2 Within the Economic Appraisal Report (Application Document 7.7, Appendix D), it was concluded that while the accident rate per million vehicle-kilometres and the overall number of accidents per kilometre reduce with the provision of the Project, there is expected to be an increase in the number of accidents due to the increased number of kilometres driven. Therefore, in order to fulfil the Applicant's aim as set out in Home Safe and Well (Highways England, 2019b) that by 2040 no-one should be harmed when travelling or working on the SRN, the Project has incorporated principles outlined within the Home Safe and Well strategy. This strategy, together with the General Principles of Prevention (HSE, 2015), ensures that safety is the primary imperative of design decisions.

4.1.3 The design review processes allowed the Project to go beyond compliance with the Home Safe & Well approach to ensure safe journeys for road users far into the future, eliminating risk at source where practicable.

4.1.4 The Project has encouraged the introduction of innovation through the implementation of the General Principles of Prevention (HSE, 2015) within the engineering disciplines. This has placed good design at the heart of the Project to ensure a better safety and environmental outcome for the future customers of the network.

4.1.5 To comply with the DMRB and the Construction (Design & Management) Regulations 2015 (HSE, 2015), the design process looked at practicable design interventions to eliminate and mitigate risk throughout the whole life cycle of the Project, from construction, through to operation and maintenance, safeguarding future road users and the highways workforce. This has been undertaken in coordination with National Highways operational teams. Where the issue has safety implications, this has been further escalated to National Highway's Safety Control Review Group for consideration, as referred to in DMRB GG 104 Requirements for safety risk assessment (Highways England, 2018a).

4.1.6 As part of the design development, various design processes and checks were undertaken to ensure that safety risks were identified and appropriate control measures incorporated into the design. Examples include the following.

Standards and design codes

a. Development of a Design Principles document (Application Document 7.5) to set out the principles on which the design has been developed. The Design Principles are a 'forward looking' document which aims to achieve positive design outcomes post DCO submission (detailed design). The Project Design Report (Application Document 7.4) documents the process and methods by which the preliminary design was developed.

b. Establishment of a Safety Control Review Group (SCRG) which provides a forum for reviewing and accepting 'safety work' in accordance with the requirements set out in the DMRB. This ensures that the Project identifies, mitigates and manages safety risk.

Utility avoidance

a. Elimination of worker safety risks by adjusting the highway alignment to minimise the diversion of significant services including gas mains and electricity cables.

b. Arranging for other services to be diverted, away from the works areas, or protected, in advance of the highway construction.

Structural design development

a. Allowing for modular offsite construction and designing-in enough space for different construction methods in compounds.

b. Allowing for integration of services through bridges as necessary, to improve coordination of safety and buildability.

Onsite considerations

a. Live design coordination with onsite ground investigation works.

b. Continuous review of construction buildability and space allocation to ensure safety provisions are incorporated into the Order Limits for the DCO.

4.2 Adverse effects on health, safety and wellbeing

DMRB GG 103 Requirement: E/1.4 Design shall identify and respond to any adverse effects on health, safety and wellbeing from projects.

4.2.1 A detailed report on the findings of an assessment of the likely effects of the construction and operation of the Project on human health and equality can be found in the Health and Equalities Impact Assessment (HEqIA) (Application Document 7.10).

4.2.2 The designers used a Design Risk Management Tool that considered both health and safety issues. Using this, an additional health hazard risk assessment was developed which considered the human factors and health hazards during some key construction activities. Health is regarded as on an

equal footing with safety and as such, is considered during both the construction and operational phases.

4.2.3 Environmental monitoring of potential hazards during construction would be carried out as identified in the REAC including air quality and dust [AQ005/006/007], noise [NV009], soil [GS014] and groundwater quality as required [GS021] (Application Document 6.3, ES Appendix 2.2).

4.2.4 The Project has engaged with the HSE on areas such as hyperbaric working, this being an unusual working method in a highways context and consequently something that is outside the current highway standards. Working with the HSE has assisted in the development of specification documents that will ensure safe working practices are incorporated into the construction methodology.

4.3 Flood risk

DMRB GG 103 Requirement: E/1.5 Measures appropriate to safeguard the resilience of the network from sources of flood risk shall be identified, assessed and incorporated into design.

4.3.1 A site-specific flood risk assessment has been prepared for the Project. This assessment is presented in ES Appendix 14.6 (Application Document 6.3).

4.3.2 In accordance with the provisions of DMRB LA 113 Road drainage and the water environment (Highways England, 2020a), flood risk has been considered to ensure that the Project:

a. remains operational and safe for users in times of flood

b. results in no net loss of floodplain storage

c. does not impede water flows

d. does not increase flood risk elsewhere.

e. Assessment of flood risk and identification of the flood alleviation measures included in the Project, consider the impact of predicted climate change and thereby enhance the sustainability of the Project (all in accordance with the latest Environment Agency guidance (Flood risk assessments: climate change allowances, Environment Agency, 2022)).

4.3.3 **Flood mitigation** measures include the following:

a. Provision of compensatory flood storage areas

b. Creating and restoring wetlands

c. Surface water drainage provisions

d. Inclusion of flood relief culverts

e. Alterations to the watercourse channels and structures

f. Alterations to the floodplain

g. Incorporation of hydraulic control structures

h. Reduction of discharge rates from existing flow attenuation structures

4.3.4 **Flood protection** measures include the following:

a. Flood bunds

b. Flood walls

4.3.5 **Flood resilience** comprises those measures necessary to ensure that the Project is less vulnerable to the effects of flooding. The following paragraphs detail examples of measures implemented by the Project.

4.3.6 **Road elevation.** Where the Project alignment crosses the floodplain it should be constructed on embankments or viaducts, with the road level set above the design flood level for the lifetime of the Project. This would protect it from all sources of flooding.

4.3.7 **Road geometry.** The vertical alignment of the highway ensures that outfall levels are achievable, and that subgrade drainage can discharge above the design flood level of any outfall watercourses. This is secured in [RDWE011]. The vertical alignment and road edge detail should be selected to ensure efficient collection of surface water runoff.

4.3.8 **Climate change.** Assessment of flood risk has considered the latest climate change allowances for peak rainfall intensity, peak river flow and sea level rise. These allowances are detailed in full in Appendix 14.6: Flood Risk Assessment (Application Document 6.3).

4.4 Sustainable Drainage Systems

DMRB GG 103 Requirement: E/1.6 Opportunities to include Sustainable Drainage Systems (SuDS) shall, where relevant, be incorporated into design.

4.4.1 The information in this Section includes data examined in more detail in ES Chapter 14: Road Drainage and the Water Environment (Application Document 6.1) and its appended Flood Risk Assessment (Application Document 6.3). The drainage system would provide an integrated design solution that considers management of carriageway runoff, flood risk and pollution risk. With the increased rainfall intensities anticipated from predicted climate change effects, preventing flooding of the carriageway for the design storm return-periods and within the various constraints of the Project is essential. The drainage design has been developed to consider efficiency and ease of maintenance. Both with respect to outfall discharge rates and water quality, the aim of the design would be to meet the requirements of all appropriate DMRB design guidance notes and standards and comply with the requirements of the Environment Agency and Lead Local Flood Authorities.

4.4.2 The drainage design incorporates SuDS and reduces the risk of causing flooding elsewhere by using attenuation features as presented on Figure 2.4 Environmental Masterplan (Application Document 6.2).

4.4.3 Retention ponds shall be provided at the locations shown on Figure 2.4 Environmental Masterplan (Application Document 6.2). New retention ponds shall be designed as vegetated drainage systems in accordance with the provisions of DMRB CD 532 (National Highways, 2021) and will be sized to ensure no increase in flood risk outside the highway boundary by providing for discharge that is attenuated to the 1 in 1year greenfield runoff rate (or one litre per second, whichever is higher) for all events up to and including the 1 in 100-year rainfall event with climate change.

4.4.4 Pollution control measures for SuDS shall comprise the treatment systems identified in Part 7 of the Flood Risk Assessment (Appendix 14.6, Application Document 6.3).

4.4.5 There are proposed to be 25 outfalls along the Project, of which seven are existing and the rest are new outfalls. The new outfalls have been designed at particular locations based on the highways alignment, ground investigation information, locations of watercourses, land available and constraints such as utilities. These outfall locations and the area of the Project that is serving each outfall are shown in the Drainage Plans (Application Document 2.16).

4.4.6 Climate change, access for maintenance and risk of flooding have all been considered in the design to ensure the proposals are sized and located appropriately.

Water quality and pollution control

4.4.7 Discharges to watercourses from highway runoff would not lead to deterioration in the Water Framework Directive (WFD) classification status of receiving watercourses and ground water bodies.

4.4.8 The risk of pollution to watercourses from highway runoff has been assessed using the Highways England Water Risk Assessment Tool (HEWRAT) which has been used to identify treatment needs. HEWRAT is described in more detail in the DMRB document LA113 Road Drainage & Water Environment (Highways England, 2020a). At detailed design, HEWRAT modelling would be used to identify efficiencies by avoiding the over-design of mitigation measures for drainage systems, e.g. the over-specification of such items as proprietary treatment devices. The results of the HEWRAT assessments are captured in ES Appendix 14.3: Operational Surface Water Drainage Pollution Risk Assessment (Application Document 6.3). An assessment has also been carried out on the proposed soakaway systems and their possible effects on groundwater receptors. This is presented in ES Appendix 14.5: Hydrogeological Risk Assessment (Application Document 6.3).

4.4.9 A variety of SuDS measures such as wetlands, sediment forebays, manufactured water quality devices and filter drains provide treatment and removal of some contaminants in highway runoff. These SuDS features have been considered in the HEWRAT and groundwater assessments described in the ES and are required by the Project to ensure that outfalls meet environmental quality standards and WFD objectives.

The control of accidental spillages

4.4.10 Spillages caused by accidents or other causes can occur anywhere on the road network. The risk of pollution from spillages on surface and groundwater receptors has been assessed using the HEWRAT, and methods for groundwater that are described in the DMRB LA 113 (Highways England, 2020a). The results of the assessments are captured in the ES Appendix 14.3 for surface water receptors and ES Appendix 14.5 for groundwater receptors (Application Document 6.3).

4.4.11 The SuDS features that are used as water treatment measures for the assessment of risk to surface watercourses have also been considered as risk reduction factors for spillage assessments at some locations in order to meet DMRB requirements. In addition, the DMRB design standards require a method of protecting vegetated drainage systems such as ponds and basins from accidental spillages, so devices that enable emergency shut-off are provided.

4.4.12 The design would ensure that easy access to these devices is provided for both inspection and maintenance, and for emergency situations, as the sooner the shut-off device can be closed, the lower the risk of pollution entering the downstream receiving waters [RDWE034, RDWE035].

4.4.13 Chemical or fuel spillages during construction would also be controlled by adherence to the Control of Substances Hazardous to Health Regulations 2002 (UK Statutory Instruments, 2002) and by appropriate design of construction compounds [GS004].

4.4.14 Where included, infiltration ponds would incorporate a lined sediment forebay with sufficient capacity to accommodate the first flush. Where sediment forebays cannot be accommodated, a vortex grit separator shall be installed upstream of the basin inlet. [RDWE034].

Pre-earthworks drainage

4.4.15 Surface water runoff from natural catchments draining towards the proposed carriageway earthworks would be intercepted by cut-off ditches installed at the top of cuttings and at the toe of the embankments. These ditches would be sufficiently deep to take the flow from the natural catchment and to intercept any severed land and agricultural drainage systems.

4.4.16 Wherever practicable, ditches for natural catchments would be kept separate from the highway runoff and treatment systems to minimise the capacity requirements for those systems.

Drainage design, environment and ecology

4.4.17 The drainage has been developed in conjunction with the environment and ecology teams to ensure that the drainage system would not have a negative impact on the environment and surrounding ecology. Mitigation measures are discussed in Section 14.5 of ES Chapter 14: Road Drainage and the Water Environment (Application Document 6.1).

4.4.18 Any vegetative treatment systems that form part of the drainage design are considered to be highway drainage treatment facilities, thus they would not be intentionally designed as sustainable ecological habitats.

4.5 Noise management

DMRB GG 103 Requirement: E/1.7 Measures to manage noise shall be enacted in accordance with the Noise Policy Statement for England.

4.5.1 The comments made in this Section are based on the contents of ES Chapter 12: Noise and Vibration (Application Document 6.1) and the Health and Equalities Impact Assessment (Application Document 7.10).

4.5.2 The Project would change the road traffic noise environment along the route corridor, especially in areas where the route passes through existing low-background noise levels. In addition, the Project has the potential to change the noise environment along bypassed routes and at other locations along the existing road network where flows and traffic composition change as a result of the Project.

4.5.3 This Section summarises what would be implemented to minimise those impacts and how the design of the Project incorporates the principles of the Noise Policy Statement for England (Defra, 2010).

Proposals for noise and vibration minimisation

4.5.4 Some level of impact is anticipated for certain receptors, as described in detail in ES Chapter 12: Noise and Vibration (Application Document 6.1). To keep these impacts to a minimum, a series of best practice measures described in the ES, are intended to minimise construction impacts.

4.5.5 Importantly, a Noise and Vibration Management Plan would be prepared and consulted on by the Contractors with relevant local authorities prior to commencing construction as described in Appendix 2.2: Code of Construction Practice (Application Document 6.3).

4.5.6 Pre-construction baseline noise levels would be submitted to the relevant planning authorities to establish a pre-construction baseline for monitoring compliance with construction noise limits [NV005] (Application Document 6.3, ES Appendix 2.2).

4.5.7 The REAC (Application Document 6.3, ES Appendix 2.2) also includes the following:

a. A Noise and Vibration Management Plan (NVMP) or equivalent would be prepared for each part of the construction works subject to Section 61 control for consideration by the relevant planning authorities [NV002].

b. Residents would be notified of particularly noisy and vibration-generating work such as percussive piling and concrete breaking prior to their commencement. The mechanisms for notification will be detailed in the Engagement and Communications Plan. Effective communication would be established, keeping local residents informed of the type and timing of works involved, paying particular attention to potential evening and night-time works and activities that may occur in close proximity to receptors [NV008].

4.5.8 Best Practicable Means to reduce noise and vibration nuisance are also required [NV007] and would include the following:

a. Installing and maintaining hoarding around the construction areas likely to generate noise

b. Keeping site access routes in good condition with condition assessments on site to inspect for defects such as potholes

c. Turning off plant machinery when not in use

d. Maintaining all vehicles and mobile plant such that loose body fittings or exhausts do not rattle or vibrate

e. Using silenced equipment where available, in particular silenced power generators and pumps

f. No music or radios would be played for entertainment purposes outdoors on site

g. Planning site layout to ensure that reversing is kept to a reasonably practicable minimum

h. Reversing manoeuvres would be supervised by a trained banksman/vehicle marshal to ensure they are conducted safely and concluded quickly

i. Non-percussive demolition techniques would be adopted where reasonably practicable to reduce noise and vibration impact.

4.5.9 The efficacy of these measures would be measured by conducting noise monitoring at key sensitive receptor locations (to be defined through development of the Code of Construction Practice and REAC (Application Document 6.3, ES Appendix 2.2)).

4.5.10 ES Chapter 12: Noise and Vibration (Application Document 6.1) explains that there would be significant adverse effects, even with the adoption of Best Practicable Means, associated with the construction of the Project due its proximity to some receptors and the scale and duration of the works. In the context of sustainable development this is considered acceptable as construction and engineering practicality also have to be taken into account. These works would inevitably introduce engineering noise and vibration into new areas.

4.5.11 Operational noise would be addressed by keeping the road as low in the landscape as practicable, which means that road surface noise is more effectively attenuated than with a more elevated highway. Acoustic barriers are also proposed to be included at six separate locations as shown on ES Figure 12.6 Operational Road Traffic Noise Mitigation (Application Document 6.2).

4.5.12 To minimise wheel-induced traffic noise, a low noise/thin surfacing system would be used across the new and altered trunk roads comprising the Project, this is secured within [NV013].

4.5.13 With the adoption of the mitigation identified above, the Project is considered to accord with the primary aims of the various relevant national policies including the Noise Policy Statement for England (Defra, 2010).

4.5.14 The Project and the mitigation measures would decrease operational noise levels in areas surrounding the Project, mostly around bypassed routes, and this would contribute to the improvement of health and quality of life in these areas.

5 Improve land, water and air quality

5.1 Contaminated land

DMRB GG 103 Requirement: E/1.8 Opportunities to prevent future land contamination and to remediate current land contamination shall be identified, assessed and incorporated into design

5.1.1 Land contamination issues have been assessed in the ground investigation reports and summarised in ES Chapter 10: Geology and Soils (Application Document 6.1).

5.1.2 29 medium-risk and six high-risk credible contamination sources have been identified within the Order Limits. Should contaminated land be disturbed during works, contamination would be controlled in accordance with good practice to minimise risks to construction workers or the wider environment.

5.1.3 Where required to remediate soil contamination, the Contractors would develop proposals for site-specific remediation in consultation with the relevant local authority [GS027]. Pre-existing contamination in soils and groundwater would be reduced as required and the risk of any mobilisation and offsite migration would be reduced.

5.1.4 The design of the new road drainage system means that any contamination arising on the Project from road spillage would be intercepted so that it minimises soil or groundwater contamination (see Section 4.4 above).

5.1.5 One of the largest construction compounds, CA5, would be located on an old landfill area adjacent to the North Portal of the tunnel. On completion of the works, clause S9.02 of the Design Principles (Application Document 7.5) states that the former Goshems Farm landfill would have a sculptural landscape designed with elevated areas to create vistas across the Thames Estuary linking with features such as Tilbury Fort and Coalhouse Fort. Pastoral agriculture use would be allowed for.

5.1.6 The Contractors constructing the Project would be required to implement a PAS 2080:2016 (British Standards Institute, 2016) compliant carbon management system and accordingly, the selection of any soil or groundwater remediation technologies would take into account the minimisation of emissions of greenhouse gases. This may include risk management and *in situ* remediation.

5.1.7 It is anticipated that contaminated groundwater would be removed from the North Portal and ramp area during dewatering for the excavation. Quantities would be minimised by using barrier walls and grouting. This contaminated water would likely require treatment prior to any discharge. While the removal and treatment of this groundwater may reduce the overall contaminant load in the area, it would be important to control this abstraction to standards agreed with the Environment Agency [GS022, GS023].

5.1.8 Where appropriate, the reuse of soils on the construction sites would be required as described in ES Chapter 11: Material Assets and Waste (Application Document 6.1) and is also required in REAC Commitment MW001 (Application Document 6.3, Appendix 2.2).

5.2 Surface water and groundwater consumption

DMRB GG 103 Requirement: E/1.9 Opportunities to preserve and improve the quality of surface and groundwater and reduce water consumption shall be identified, assessed and incorporated into design.

5.2.1 A full description of the impacts of the Project on the water environment is included in ES Chapter 14: Road Drainage and the Water Environment (Application Document 6.1) from which most of this Section has been derived.

5.2.2 **Preserving and improving surface water.** The design of the Project has been prepared to ensure that discharges from the carriageway would not lead to deterioration in the WFD objectives and classification status of receiving watercourses. Further details of this are included in Section 4.4 of this Sustainability Statement, on SuDS.

5.2.3 The iterative design of the Project has meant that some changes have reduced the potential for impacts on the water environment, including the following:

a. Careful siting of infiltration basins for operational drainage has maximised their distance from the nearby protected wetland area (which is a designated Ramsar site), contaminated sites, and reduced the potential for groundwater flooding or sink hole development.

b. Designing viaducts over the Mardyke, the Orsett Fen Sewer and the Golden Bridge Sewer has avoided channel and riverbank disturbance, protected the local hydromorphological regimes and avoided cutting off ecological habitats. This also minimises floodplain loss and connectivity.

5.2.4 ES Chapter 14: Road Drainage and the Water Environment (Application Document 6.1) concludes that the impacts of construction on surface water would be no worse than slight adverse and temporary in nature.

5.2.5 **Preserving and improving groundwater.** The design of the drainage system with spillage control, natural attenuation and treatment of discharges and ultimately soakaways to groundwater, would minimise the potential for contamination of groundwater [RDWE034]. ES Chapter 14: Road Drainage and the Water Environment (Application Document 6.1) summarises the impacts of the operational phase on groundwater as no worse than slight adverse.

5.2.6 The North Portal excavation lies in the former Goshems Farm Landfill and ground investigation evidence suggests that groundwater in this area has been contaminated by its former use as a waste disposal site between the 1920s and 1990s. A groundwater control and pumping regime would be necessary to allow the construction of the North Portal and approach ramp. Groundwater controls could include ground treatment, cut off walls and hydraulic barrier creation. Detailed modelling, agreed with the Environment Agency, would protect other groundwater in this area [GS021].

5.2.7 The abstracted water would be decontaminated, prior to licensed discharge, in this way protecting both vulnerable groundwater and surface water in the area [RDWE023].

5.2.8 Design changes that have assisted with groundwater protection include the following:

a. Avoidance of areas overlying source protection zone 1, the most vulnerable.

b. Moving the South Portal further uphill and south than originally envisaged has avoided any impacts resulting from dewatering in this area.

5.2.9 Reducing water consumption. Water use efficiency and leakage reduction measures would be adopted during the construction phase, measures such as use of water-efficient fittings (taps, toilets etc.) in site offices and welfare facilities, use of misting/atomising systems for dust suppression, drive-on recirculating systems for wheel washing, and sub-metering to help in detecting leaks where reasonably practicable will be considered. [RDWE004].

5.2.10 The construction compounds include surface water drainage for all surfaced roads and yards, buildings and any other hard or impermeable surfaces. The Contractors shall develop a construction phase drainage plan. The plan shall demonstrate how the Contractors would manage surface water runoff across the worksite, including details of how offsite impacts would be prevented. [RDWE006].

5.3 Air quality

DMRB GG 103 Requirement: E/1.10 Opportunities to achieve air quality improvements from construction, use and decommissioning shall be identified, assessed and incorporated into the design.

5.3.1 The air quality effects of the Project have been described in ES Chapter 5: Air Quality (Application Document 6.1).

5.3.2 The Project has been aligned to avoid highly populated communities so far as practicable. This reduces the population that could experience a decrease in air quality compared to other possible routes.

5.3.3 **Construction phase.** Construction phase good practice measures for air quality are outlined in the REAC (Application Document 6.3, Appendix 2.2). They include measures to reduce the air quality effects associated with construction dust as well as emissions from non-road mobile machinery (NRMM) and construction vehicles [AQ001, AQ002, AQ003, AQ004, AQ005, AQ006, AQ007 and AQ008].

5.3.4 **Operational phase**. The air quality modelling results show that the operation of the Project would result in both improvements and deteriorations in local air quality as a result of Project-associated changes in traffic flows.

5.3.5 ES Chapter 5: Air Quality (Application Document 6.1) outlines the measures to reduce the operational impact of the Project where there are predicted exceedances of the annual mean NO_2 AQS objective and worsenings in annual mean NO_2 concentrations as a result of the Project. Numerous measures have been investigated and further work is ongoing to explore the feasibility of introducing measures to reduce the air quality impact of the Project.

5.3.6 The Project is considered to have a significant effect on designated habitats for ecology because of an increase in nitrogen deposition, as outlined in Chapter 8: Terrestrial Biodiversity (Application Document 6.1).

5.3.7 Measures designed to mitigate and compensate for adverse effects on designated habitats are detailed in the Project Air Quality Action Plan (PAQAP) (Appendix 5.6, Application Document 6.3).

5.3.8 As outlined within this Section, opportunities to achieve air quality improvements from construction, use and decommissioning have been and are continuing to be explored. As outlined within ES Chapter 5: Air Quality (Application Document 6.1) the impacts during the construction phase will not lead to a significant effect on local air quality on human health receptors. Furthermore, the Health and Equalities Impact Assessment (Application Document 7.10) concluded that the overall air quality impacts of the Project were neutral and that no disproportionate or differential impact has been identified for those with protected characteristics in relation to changes in air quality during operation. Where adverse air quality impacts on designated habitats have been identified, measures have been designed to mitigate and compensate which are outlined within the PAQAP (Appendix 5.6, Application Document 6.3).

6 Serve to support a sustainable economy

6.1 Local, regional or national economic objectives

DMRB GG 103 Requirement: E/1.11 Measures that support local, regional or national economic objectives shall be identified and, where relevant, incorporated into design.

6.1.1 As outlined within the monetary policy remit (HM Treasury, 2021), the Government's national economic objective is to achieve strong, sustainable and balanced growth. Price and financial stability are essential prerequisites to achieve this objective in all parts of the UK and sectors of the economy. Delivering this objective also requires a credible fiscal policy and the maintenance of sustainable public finances, while providing flexibility to support the economy, and structural reform to level up opportunity in all parts of the UK and transition to an environmentally sustainable and resilient net zero economy. This will be implemented through regulation and an ambitious programme of investment in skills, infrastructure and innovation in order to sustain high employment, raise productivity, improve living standards and reduce poverty.

6.1.2 The Project is anticipated to contribute to these objectives via improvements in connectivity which are likely to result in stronger north-south business relationships and higher commuter flows as workers move to more productive, and thus higher-paying jobs.

6.1.3 The Need for the Project (Application Document 7.1) explains that the case for improving England's SRN is made in the NPSNN. This says that improving maintenance and asset management, demand management and modal shift all play their part in the case for network improvements such as the Project. It goes on to explain that without improving the road network, it would be difficult to support further economic development, employment and housing and this would impede economic growth and reduce people's quality of life.

6.1.4 Section 2.27 of the NPSNN states that in some cases it would not be sufficient to simply expand capacity on the existing network. Where this is the case, new road alignments and corresponding links, including alignments which cross a river or estuary, may be needed to support increased capacity and connectivity.

6.1.5 A national-level appraisal of the Project's economic, environmental and social impacts has been carried out in line with Government guidance and is described in the Economic Appraisal Report (Application Document 7.7, Appendix D).

6.1.6 The Economic Appraisal Report (Application Document 7.7, Appendix D) outlines the largest monetised benefits of the Project as journey time savings, static productivity benefits and journey time reliability benefits. In total, the benefits of the Project sum up to £3,300 million which exceeds the net cost of £2,700 million. It concludes that the economic benefits would contribute to the national, regional and local objectives.

6.1.7 The Project would contribute to the economic pillar of sustainability and local, regional and national economic objectives via the increased connectivity it would provide, proffering businesses improved accessibility to key markets

which would boost the productivity of businesses, including ports, in the Lower Thames area and more widely. Furthermore, enhanced connectivity and cross-river economic opportunities would further stimulate competition, boosting employment, increasing inward investment and creating a single market in the Lower Thames area. The Project would also provide greater access to local and regional businesses for the surrounding communities. The local population would have increased cross-river access and therefore, better links to jobs, skills and training would benefit local communities.

6.1.8 The Economic Appraisal Report (Application Document 7.7) and the Need for the Project (Application Document 7.1) describe in more detail the distribution of benefits for the region and the local areas.

6.2 Economic disturbance effects

DMRB GG 103 Requirement: E/1.12 Opportunities to reduce disturbance effects on local economies shall be identified and, where relevant, incorporated into design.

DMRB GG 103 Requirement: E/1.12.1 Opportunities to reduce disturbance effects on local economies may include:

1) measures to reduce severance of businesses from resources or markets;

2) measures to minimise changes to the productivity of environmental resources upon which local business depend (for example loss of high-quality soils).

6.2.1 DMRB GG 103 (Highways England, 2019a) describes how opportunities to reduce disturbance effects on local economies may include measures to reduce severance of businesses from resources or markets. Section 9.2 of this Statement describes the impact of the Project in terms of direct and traffic-related severance. Direct severance is that which might arise from the route itself while traffic-related severance is that caused by any increase in traffic on an existing route.

6.2.2 The Project would also have positive local economic impacts, reducing existing severance for businesses. The £3,300 million of benefits reported in the economic appraisal (see Section 6.1) includes £1,375 million of static clustering productivity benefits which reflect the gain for businesses from being effectively brought closer together by the Project without any changes in their physical location. This increased business proximity to suppliers and customers yields knowledge and technology synergies and allows the creation of deeper business and labour markets.

6.2.3 However, evidence has also been gathered about the potential for the Project to generate further wider economic impacts based on changes to land use such as productivity benefits from dynamic clustering, further reducing business severance. This evidence is presented in the Level 3 Wider Economic Impacts Report (Application Document 7.7, Combined Modelling and Appraisal Report). The evidence has found that the Lower Thames economy has strong east-west business links to London, but there is little interaction and competition between local businesses on the two sides of the estuary, resulting in wasteful duplication of activities and an acutely severed labour market.

6.2.4 The connectivity improvements provided by the Project are expected to lead to behavioural responses by businesses such as the reorganisation of their production, physically relocating and increasing investment levels. These business responses to the expanded market area, creating a ‘single market’ in the Lower Thames area, are likely to result in significantly stronger north-south business relationships and higher commuter flows as workers move to more productive, and thus higher-paying jobs.

6.2.5 Businesses most likely to gain are those in sectors where there is evidence of existing business clusters, namely construction, transport and logistics, business support services, agri-food and emerging clusters such as creative industries. The scale of these variable land use impacts could be significant locally and regionally, leading to the economic transformation of the Lower Thames area, and be important nationally.

7 Represent good 'whole life' value across the design life of road infrastructure

7.1 Whole life value

DMRB GG 103 Requirement: E/1.13 Whole life costing shall be used to inform all design decisions, particularly when demonstrating the pay back periods for, and cost benefits of, innovations.

DMRB GG 103 Requirement: E/1.14 Measures to reduce the need for maintenance, repair, refurbishment, and replacement to increase design life shall be identified and, where feasible, incorporated into the design.

7.1.1 Following the requirements of DMRB CD 350 The Design of Highway Structures (Highways England, 2020b), which aims to improve the durability of highway structures and minimise the need for future maintenance, the design working life of the various elements of the Project would be >120 years for the tunnel, all bridges, retaining walls and buried structures. Unless defined in other standards or project-specific requirements, the design working life of a highway structure should take into account:

a. functional requirement

b. safety or consequence

c. traffic disruption

d. durability

e. sustainability

f. financial

g. practical feasibility if it were to be replaced in the future.

7.1.2 These considerations inform the process that would be followed in the detailed design and is covered in the tender scope with the whole life cost model and asset management forward plan, where the Contractors will demonstrate how the design of assets will be maintained and renewed to meet the network availability targets for the Project.

7.1.3 The Project may be vulnerable to a range of potentially significant climate resilience effects during the construction and operational phases. Measures to ensure the Project is resilient to the potential impacts of climate change have been embedded into the design of the Project (these are outlined within Appendix 15.3 of the ES (Application Document 6.3)). These measures would aid in reducing the need for maintenance, repair, refurbishment and replacement as a result of the changing climate.

7.1.4 The DMRB standards GD 304 Designing Health and Safety into Maintenance (Highways England, 2020c) and CD 355 Application of Whole-life Costs for Design and Maintenance of Highway Structures (Highways England, 2019c) have particular relevance to the whole-life cost of the Project, and the

implications of design choices would also be applied in the detailed design phase of the Project.

7.1.5 DMRB GD 304 sets out how the detailed design would consider health and safety aspects throughout the whole life of the Project. It requires a detailed assessment of the risks to be considered in the design process, including the suitable and sufficient consideration of maintenance to achieve safety improvements and whole-life cost savings.

7.1.6 When considering design decisions and potential changes, the risk assessment would consider the impact of these changes on the safety of all population groups and identify whole-life costs or savings to ascertain a robust decision for the design change. DMRB GD 304 (Highways England, 2020c) requires that the design of the Project considers a whole-life asset design approach that is both safe for all populations and sustainable in the long term.

7.1.7 The purpose of DMRB CD 355 (Highways England, 2019c) is to present a common procedure for estimating the whole-life cost of alternative designs or maintenance interventions and to give the Applicant an estimate of the cost of ownership of an asset throughout its life. It should also provide a basis for the management of the asset and planning of maintenance activities.

7.1.8 DMRB CD 355 outlines the methods to be adopted to evaluate the life-cycle costs of different options and the production of a life-cycle management plan for the adopted solution.

7.1.9 Using these guidance documents, the Project has developed a baseline Whole Life Cost Model (as outlined within the Economic Appraisal Report (Appendix D, Application Document 7.7)) with maintenance and renewal frequencies taken from standards and best practice across National Highways' maintenance contracts. The model is based on a 60-year assessment period, demonstrating the yearly operational costs of the Project. The Contractors would demonstrate their assessment of whole life value, based on their detailed design, in submission of their Whole Life Costs Model, Asset Management Forward Plan and Whole Life Carbon Model as part of the tender submission pack.

7.1.10 In summary, these standards would provide the Contractors with sufficient clarity on the need for whole-life costing to effectively inform the detailed design.

8 Embrace innovation

8.1 Innovation

DMRB GG 103 Requirement: E/1.15 Innovations (design, technology, practice, behaviour, other) that deliver enhanced sustainable development outcomes shall, where relevant, be identified, and subject to necessary approvals required by National Highways, incorporated into the design.

8.1.1 Innovation was considered during the preliminary design phase and will continue to be incorporated where possible during detailed design. The following paragraphs give examples of what innovations were used, what actions were taken to develop these and how they have contributed to sustainable outcomes.

8.1.2 **Carbon Emissions Calculation.** The Project has developed a detailed greenhouse gas emissions footprint at the design stage. This helped focus attention on assets and materials with the greatest associated carbon emissions and on reducing material use or changing construction methods to reduce emissions. The design has included a number of carbon emissions reductions (ES Appendix 15.1: Carbon and Energy Plan (Application Document 6.3)), with further reductions to be incorporated during detailed design.

8.1.3 **Tunnel and highways energy efficiency.** The operation of the tunnel would require electrical energy for lighting, ventilation and pumping. A number of innovations or state-of-the art items have been included in the design to increase efficiency and consequently minimise carbon emissions. These are outlined within the Carbon and Energy Plan (Appendix 15.1, Application Document 6.3). Further exploration of energy efficiency will be explored throughout detailed design.

8.1.4 **PAS 2080 – Carbon Management in Infrastructure (British Standards Institution, 2016).** The Applicant would require the Contractors for the Project to gain verification for this management system which aims to manage and reduce carbon emissions throughout the supply chain. Although this management system is not new, it is the first time this has been done on a highways scheme of this scale in the UK. The Contractors would be required to develop a PAS 2080-compliant approach, explaining how they would identify, prioritise, implement and monitor carbon reduction opportunities, to build on the work carried out to reduce emissions during the design phase.

8.1.5 **Component standardisation.** The Contractors would be required to review the detailed design process to identify areas where construction components could be standardised to minimise the number of construction processes required. This would have the effect of reducing waste and improving material efficiency. Examples of such components could include bridge beams, abutments and piers [MW003].

8.1.6 **Modularity and offsite construction.** The prefabrication of structures and components can aid sustainability by reducing waste and resource depletion while also making construction sites safer. Contractors are actively innovating in this area and they would be encouraged to do so on the Project [MW004].

8.1.7 **iRAP - International Road Assessment Programme** (iRAP, 2020). For the Applicant, safety is the first imperative. The star rating protocol, set out in the iRAP is a way to measure the safety standard of the SRN. The whole of the SRN is assessed periodically to assess star ratings. The Project has utilised this assessment tool as a design tool that also aligns with Safe System principles (design and operation working together to prevent collisions). The aim of the design stage is to ensure the star rating is assured before construction rather than after. iRAP supports this approach as a way forward in optimising road safety at an early stage in the design process.

8.1.8 **Green compounds.** The Contractors would be required to provide a number of sustainable features in the work compounds that are new to National Highways and represent best practice. These include the following:

h. Contractors will be required to use only electricity from certified renewable sources in the construction of the Project, with at least 20% of the demand for site compounds and offices expected to be from onsite renewables (Carbon and Energy Management Plan (Application Document 7.19).

i. Contractors will be required to provide and maintain electric vehicle charging facilities, using zero carbon electricity, for 30% of parking capacity in each compound, increasing this as necessary to satisfy demand (Carbon and Energy Management Plan (Application Document 7.19).

j. Contractors will use zero tailpipe emission vehicles for all staff movements within the working areas of compounds and to and from public transport hubs (Carbon and Energy Management Plan (Application Document 7.19).

k. Contractors will promote the use of active transport for personnel to and from the compounds and provide managed electric charging facilities for e-bikes at each compound, in covered cycle parking areas, to satisfy demand (Carbon and Energy Management Plan (Application Document 7.19).

9 Reduce inequalities and ensure access for all

9.1 Reducing inequalities

DMRB GG 103 Requirement: E/1.16 Adjustments to any aspect of design that address the needs of users and stakeholders with protected characteristics that are covered by the Equality Act 2010, or who are affected by socio-economic disadvantage, shall be identified, assessed and incorporated into the design.

DMRB GG 103 Requirement: E/1.17 Where opportunities arise designs shall seek to foster good relations between people with protected characteristics and those without protected characteristics.

9.1.1 Information in this Section is described in greater detail in the Health and Equalities Impact Assessment (Application Document 7.10). Relevant standards in the DMRB that apply to this subject are DMRB CD 143 Designing for Walking, Cycling and Horse-Riding (Highways England, 2020d); DMRB CD 353 Design Criteria for Footbridges (Highways England, 2020e); DMRB CD 352 Design of Road Tunnels (Highways England, 2020f), plus the DfT's Inclusive Mobility (2021), and Local Transport Note 1/20 Cycle Infrastructure Design (2020).

9.1.2 CD 143 states that walking, cycling and horse riding routes should be designed to achieve a series of design principles, including that they should be continuous and easy to navigate, should meet design standards and cater for all types of user, including children and disabled users.

9.1.3 During consultation, the Applicant engaged with different road user groups, including holding a disabled motorists forum, to allow a consistent approach to all road users during incidents and emergencies (Application Document 5.1, Consultation Report).

9.1.4 The Project design has considered road users with protected characteristics in the provision of information. For example, in the tunnel there would be a public address system, as well as visual aids, to guide road users in the event of an incident or emergency.

9.1.5 Inclusive Mobility (DfT, 2021) and other DMRB standards show how footbridges, green bridges and underpasses would be accessible to all users, including those using wheelchairs, and designed to ensure the safety of vulnerable users. Examples include bridges designed with rails at appropriate heights for users with mobility issues and, where appropriate, include appropriate lighting to ensure maximum safety and security.

9.1.6 Inclusive Mobility (DfT, 2021) identifies a walkway width standard of a minimum of 1.0m. The section of the Project within the tunnel specifies a walkway width of 1.2m, limited to 1.0m only at the locations of rising services and emergency panels, to improve mobility for vulnerable users in the event of an emergency in the tunnel. The tunnel design allows for a battered kerb to the walkway for wheelchair access with a maximum height of 75mm.

9.1.7 Access to emergency telephones would be provided for mobility impaired customers in the tunnel and at emergency areas on the highway.

9.1.8 Wayfinding signs would be provided in the tunnels as well in accordance with DMRB CD 352 (Highways England, 2020f).

9.2 Network accessibility/connectivity/non-motorised users

DMRB GG 103 Requirement: E/1.18 Where it is safe to do so opportunities to improve accessibility for all network users shall be identified, assessed and incorporated into the design.

E/1.18.1 Opportunities to improve accessibility for all network users may include:

1) identification and assessment of the local accessibility needs of non-motorised users where the road network allows for their accommodation to better link with local facilities;

2) identification and assessment of the needs of users with mobility issues where pedestrians interface with the road network;

3) enhancements to transport connectivity.

9.2.1 **Construction phase.** An assessment of construction phase traffic impacts has been described in the Transport Assessment (Application Document 7.9).

9.2.2 This states that the works required to construct the Project would affect routes used by walkers, cyclists and horse riders, primarily where construction results in changes to the affected routes. In most cases the construction of new permanent diversions or over- and under-bridges, would carry the PRoW safely past the works. Walkers, cyclists and horse riders may also be affected by changes in traffic levels, particularly due to Project construction traffic. Locations where routes used by walkers, cyclists and horse riders would be temporarily diverted, realigned or closed to accommodate the construction of the Project are shown in Appendix A of the Transport Assessment (Application Document 7.9).

9.2.3 Construction works would be planned to reduce the durations that footpaths, cycleways and bridleways would need to be closed. The Contractors would also have to engage with the public and stakeholders over such closures, signpost these clearly in consultation with the local highways authority and use social media to update the public in real time of closures and diversions [PH001].

9.2.4 **Operational phase.** A detailed assessment has also been made of the impacts on accessibility during the operational phase. The Health and Equalities Impact Assessment (Application Document 7.10) examined access by private vehicle during the operational phase, to a range of destinations such as primary and secondary schools, Special Educational Needs establishments, further education colleges/universities, employment, hospitals and medical practices, railway stations, shopping facilities and social welfare facilities. Modelled zones were Brentwood, Dartford, Gravesham, Havering, Medway and Thurrock with the destinations being spread across the wider region.

9.2.5 The findings of this operational phase modelling showed that the Project is expected to have a neutral impact on traffic-related severance.

9.2.6 The design of the Project has also taken into account the requirements of disabled users on the pavements and footpaths where they connect with the

Project, in accordance with DMRB CD 143 (Highways England, 2020d) which states that the infrastructure should, where practicable, meet design standards and cater for all types of user including children and disabled users. This has included consideration of where an emergency might require disabled people to escape safely from the tunnel or other structures (see Section 9 above).

9.2.7 **Active travel.** In terms of active travel, such as walking or cycling, all minor roads severed during construction, other than Hornsby Lane, would be re-linked either along their original alignment or with very little deviation from the original alignment. For example, to the north of the River Thames, there would be a slight increase in road length (less than 50m) and thereby journey time for walkers as a result of minor changes to the alignments of Muckingford Road, Brentwood Road, Rectory Road, Stanford Road, Stifford Clays Road and Ockendon Road. This would have a beneficial effect on journey quality for local residents using the route and would have no implications for severance.

9.2.8 The design of the Project would include the creation of green bridges at Thong Lane, Brewers Road, North Road, Muckingford Road, Rectory Road and Green Lane. The purposes of the green bridges are to maintain and enhance connectivity for walkers, cyclists and horse riders, while also creating habitat corridors. The green bridges would allow for a better and more natural environment than a conventional bridge, for those using, crossing and living in the immediate vicinity of the Project.

9.2.9 All severed PRoWs, bridleways and cycle routes would be re-linked across the Project, unless better quality routes can be provided nearby; the route can be rationalised to better link communities with the places they want to go to; or realigned routes provide better connectivity into the existing WCH network. Permanent changes to the PRoW network are set out in the Transport Assessment (Application Document 7.9).

9.2.10 The design incorporates provision of new routes for walkers, cyclists and horse riders, designed to improve access to the existing network and maximise access to local facilities for users (including those with limited mobility) while considering and mitigating potential impacts from misuse and antisocial behaviour through good design.

9.2.11 Examples of upgraded active transport connections include the following:

a. Footpaths upgraded to bridleways – 12.2km

b. New or improved shared pathways beside roads – 15.1km

c. New bridleways – 13.9km

d. Realigned bridleways – 0.5km

e. Improved bridleways – 5.1km

f. New pedal cycle route – 1.5km

g. New footpath – 3.2km

h. Realigned footpath or improved – 3.8km

i. New permissive pedestrian route – 5km

j. New permissive pedestrian/cycle route – 0.5 km

k. New permissive pedestrian/cycle/horse riding route – 1.4km

9.2.12 In total, these new or upgraded active transport connections add up to over 62km, almost three times the length of the Project main carriageway.

10 Use responsibly sourced materials that minimise adverse impacts on people and their environment

10.1 Responsible sourcing

DMRB GG 103 Requirement: E/1.19 Designs shall not restrict the use of materials with proven sustainability credentials.

10.1.1 The Applicant states in their 2020 Sustainability Report, Beyond the SRN: Our Human Drive (Highways England, 2020g) that they intend to play their part to support the UK construction industry to responsibly source its materials and enable production processes that support workers, communities and the environment. The intention is to develop an approach to ensure responsible sourcing and sustainability goals are reflected in model contracts

10.1.2 For this reason, Contractors would use the BRE Framework Standard for Responsible Sourcing (BES 6001) (British Standards Institution, 2014), to verify imported materials are sustainably sourced and managed, to reduce the impacts throughout the supply chain [MW002].

10.1.3 The BES 6001 standard covers organisation management and supply chain management at the organisations seeking certification and includes the consideration of sustainable practices in the development of the product or material as well as the product itself. The company seeking certification should cover the following:

a. Greenhouse gas emissions
b. Energy use
c. Resource use
d. Waste prevention and waste management
e. Water abstraction
f. Lifecycle Assessment (LCA)
g. Ecotoxicity
h. Transport impacts
i. Employment and skills
j. Local communities
k. Business ethics

10.1.4 The Contractors would be required to review the design and investigate opportunities to standardise (where reasonably practicable) construction aspects, for example, beam depths, abutment sizes and piers to increase efficiency of materials use in production and reduce waste production. This initiative would be progressed through detailed design and documented in a material efficiency design report submitted to National Highways prior to construction [MW003].

10.1.5 The Contractors would be required to review the design to investigate the use of prefabricated structures and components; and encourage a process of assembly rather than construction onsite where economically and technically feasible [MW004].

11 Be resource efficient and reflect a circular approach to the use of materials

11.1 Material reuse

DMRB GG 103 Requirement: E/1.20 Design solutions shall seek to minimise the consumption of materials and the generation of waste.

11.1.1 The Applicant's approach to material sustainability is set out in documents such as the 2020 Sustainability Report, Beyond the SRN: Our Human Drive (Highways England, 2020).

11.1.2 The greatest opportunities for improving resource efficiency occur early in the civil engineering life cycle. Therefore, the design of the Project has pursued the objective of designing out material consumption. Examples where changes to the design have reduced material demand, include:

a. Removal of southbound auxiliary lanes north of junction 29 on the M25.

b. Reduction of the Project road from three lanes to two between the M25 and A13 (southbound).

c. Moving the South Portal approximately 350m south from the location presented at Statutory Consultation, resulting in a reduced excavation for the road cutting.

d. Retention and reuse within the Order Limits of excavated materials and treated tunnel boring machine slurry to fulfil the Project's requirements for fill and landscaping material.

e. Re-routed road alignment between Hornsby Lane and Muckingford Road to reduce the number of existing pylons to be diverted, and at North Ockendon to avoid the construction of a new gas compound and associated high pressure gas networks.

f. Refinement of compound locations and layouts to reduce the requirements for vegetation clearance and vegetation waste generation.

11.1.3 These changes have not impacted the integrity of the design but have reduced the volumes of aggregate, asphalt, concrete and steel and therefore, reduced the carbon emissions associated with construction.

11.1.4 Materials have also been selected with a consideration of the desirability of a long design life. The highway's permanent works have been designed for a 60-year design life while the tunnel is designed for an operational life of at least 120 years. Applying these principles means that maintenance requirements would be minimised, again reducing resource consumption, but also maximising the amount of time the full route would be unaffected by routine maintenance. The result of this would be less waste and replacement of redundant equipment.

11.1.5 To further reduce the demand for primary resources, the construction Contractors would be set a target of at least 31% for the importation of

aggregate from recycled or secondary sources, as long as engineering specifications permit this [MW001]. This target takes into account the likely regional supply of such materials.

11.1.6 During the design, the waste hierarchy was applied, as set out in DMRB LA 110 (Highways England, 2019d) Material Assets and Waste. This means that waste management alternatives such as prevention/avoidance, reuse, recycling and recovery should be adopted before disposal is considered.

11.1.7 Using this principle, 11.5 million cubic metres of material wastage and excess excavated materials would be avoided. Details of how this was achieved are given in ES Chapter 11: Material Assets and Waste (Application Document 6.1), including the reuse of aggregates excavated in the course of the Project, which reduced the need to import material.

11.2 Reuse of materials

DMRB GG 103 Requirement: E/1.20.1 Opportunities to reuse site-won materials or arisings from on-site demolition, where available, should be identified, assessed and incorporated into design.

11.2.1 ES Chapter 11: Material Assets and Waste (Application Document 6.1) explains how the design stage has been developed to maximise the reuse of site-won materials. Current calculations identify a total of approximately 11.5 million tonnes of earthworks would be reused on site. In addition to this, approximately 6,900 tonnes of demolition rubble would be generated and reused by the Project. The Contractors are expected to reuse a minimum of 70% of this waste, as some demolition material may contain asbestos which cannot be reused [MW001].

11.2.2 Clearing the route and construction compounds of vegetation would produce approximately 39,000 tonnes of green material. It is proposed that this be recovered to produce a material suitable for ecological mitigation purposes such as mulching or hibernacula construction [MW010].

11.2.3 Using these techniques and targets, it is anticipated that the Contractors could achieve a 90% diversion from landfill for non-hazardous construction wastes with a minimum recovery of 70% [MW013]. Where inert excavated material and inert construction waste cannot be used on site, the Contractors would ensure a minimum of 95% of inert construction, demolition and excavation waste destined for off-site waste management outside the Order Limits would be diverted from final disposal to landfill [MW011].

11.3 Designing for circular economy

DMRB GG 103 Requirement: E/1.21 Safe design solutions that enable deconstruction, demounting and decommissioning to facilitate future high value recycling, re-manufacture or re-use at end of first life, shall be identified and where feasible incorporated into design.

11.3.1 The tunnel and main structures of the Project have been designed for a working life of over 120 years. After this time structural health monitoring will determine the need to retain, refit or refurbish the structure and ensure that its integrity is maintained.

12 Minimise greenhouse gas emissions

12.1 Minimise greenhouse gas emissions

DMRB GG 103 Requirement: E/1.22 Carbon emissions (greenhouse gases or carbon dioxide equivalents) associated with the whole life of a project shall be minimised.

E/1.22.1 The minimisation of carbon emissions may be achieved by working in accordance with a recognised standard or specification agreed with Highways England e.g. Carbon Management in Infrastructure PAS 2080:2016

12.1.1 The Economic Appraisal Report (Application Document 7.7) uses the TAG guidance to undertake an appraisal of the Project's impact on greenhouse gas emissions. It considers four types of embodied carbon emissions, namely construction carbon, operational emissions, maintenance emissions and renewals emissions. It concludes that the total greenhouse gas emissions from the Project are 6.6 million tonnes and reflects the difference between the Without-Scheme and With-Scheme scenarios.

12.1.2 Highways England's standards for reducing greenhouse gas emissions are laid out in DMRB LA 114 Climate (Highways England, 2019e) and DMRB GG 103 Introduction and General Requirements for Sustainable Development and Design (Highways England, 2019a).

12.1.3 As a first step to minimising greenhouse gas emissions, the Project has quantified its emissions across the construction and operational phases, following the principles of PAS 2080.

12.1.4 The Carbon and Energy Management Plan (Application Document 7.19) outlines the detailed calculation identifying the key areas of carbon emissions over the six years of construction and 60 years of operation (total 66 years). These calculations and subsequent conclusions are bolstered by the Economic Appraisal Report (Appendix D, Application Document 7.7).

12.2 The Carbon and Energy Management Plan sets out how the Project would minimise its carbon impact during construction and operation.

12.2.1 The Project has been designated by National Highways as a pathfinder project to explore carbon neutral construction and to support the Applicant's broader plan to become a Net Zero business, described in Net Zero highways (National Highways, 2021b). To deliver on this, the Applicant has set the following carbon aims for the Project:

a. To construct it for the lowest practicable carbon emissions

b. To test low carbon innovation and approaches

c. To leave a legacy that enables future projects to achieve carbon neutral construction

12.2.2 In addition, the Project has committed to a best practice carbon management approach encompassing PAS 2080, carbon quantification, carbon reduction

and innovation, low carbon design, low carbon materials, market and management. These commitments are outlined within the Carbon and Energy Management Plan (Application Document 7.19).

12.2.3 ES Chapter 15: Climate (Application Document 6.3) reports upon carbon emissions and outlines measures implemented within the design to reduce greenhouse gas emissions, including:

a. removing the bridge at Hornsby Lane

b. reducing the number of lanes on the Project road south of the M25

c. widening the existing Rectory Road rather than constructing a new highway

d. reducing the span of the Tilbury Viaduct from 1.2km to 600m

e. removing the formerly proposed A226 junction

f. removing the formerly proposed A128 junctions with the Project and A13

12.3 Lowest carbon ambition

12.3.1 The Applicant's ambition is to construct the Project for the lowest practicable carbon emissions, to test low carbon innovation and approaches, and to leave a legacy that enables future projects to achieve carbon neutral construction. This supports a broader plan to become a Net Zero business, described in Net Zero highways (National Highways, 2021b).

12.3.2 The Carbon and Energy Management Plan (Application Document 7.19) sets out in greater detail how the Applicant will deliver these carbon aims.

12.3.3 Using the many carbon reduction commitments being made by the Applicant, managed through both the Carbon and Energy Management Plan and the PAS 2080 Carbon Management in Infrastructure system, the Project will demonstrate that it is applying the best practicable approach to minimising carbon emissions from the construction and operation of the Lower Thames Crossing.

13 Be resilient to future climate change

13.1 Climate change resilience

DMRB GG 103 Requirement: E/1.23 Resilience to future climatic conditions specific to the local and surrounding area shall be identified, assessed and incorporated into the design

13.1.1 An assessment of the vulnerability of the Project to the impacts of climate change has been conducted and is explained in detail in ES Chapter 15: Climate (Application Document 6.1).

13.1.2 As discussed in Sections 4.3 and 4.4 of this statement, an examination of flood risk to the Project has been conducted and a design for a SuDS compliant scheme prepared.

13.1.3 To make the Project safe from flooding over its design lifetime, a suite of flood alleviation measures would be incorporated. Examples of such measures include altering road geometry to set the vertical alignment of carriageways above the design flood level (inclusive of sufficient allowance for climate change resilience) [RDWE029] and providing flood bunds or walls to protect areas where the vertical alignment of the road is lower than the design flood level.

13.1.4 In addition to the risks climate change brings from rising sea levels and higher levels of flood risk, a wide range of other climate resilience impacts are considered using the UK Climate Projections 2018 (UKCP18) climate change predictions (Met Office, 2019) as an indication of likely climate change.

13.1.5 The impacts considered include the following:

a. Increased frequency and intensity of heavy rainfall, flooding and storm events overwhelming the drainage system, and inundation of the highway
b. Possible overheating of information and communication systems as a result of increased frequency of hot days and heatwaves
c. A change in the landscape character because of decreased mean rainfall or increased mean temperature
d. Risks to vulnerable infrastructure or vehicles from increased storm events
e. Skidding risks from ‘summer ice’ - the highway becoming slippery when wetted after a prolonged drought
f. The increased deterioration of road markings reducing the safety of road users because of increased frequency and intensity of storms
g. Road network could become inaccessible due to submergence in flood water.

13.1.6 Potential climactic conditions specific to the local and surrounding area that could occur in the future have been identified and subsequently assessed within ES Chapter 15: Climate (Application Document 6.1). Extensive mitigation to make allowances for these eventualities has been outlined within the chapter and incorporated into the design of the Project. Consequently, the conclusion of Chapter 15 was that none of the identified impacts would be significant. Therefore, the Project should be capable of withstanding the climate change likely to occur during its design life.

14 Protect and where possible enhance, the surrounding environmental and cultural context

14.1 Working in Sympathy with the Environment

DMRB GG 103 Requirement: E/1.24 The design shall work in sympathy with, and seek to enhance, the surrounding natural, built and historic environment.

14.1.1 The architecture and landscape design aims to connect road users with the places through which they pass. Also important, is minimising impacts on the historic environment, local communities, wildlife and other environmental assets.

14.1.2 The Design Principles (Application Document 7.5) underpin the design and integration of the Project in its context. They capture the key principles that have shaped the design thus far. They also make a commitment that these will be maintained and developed in the future detailed design and delivery phases of the Project to be in accordance with NPSNN requirements for 'good design'.

14.1.3 The Design Principles (Application Document 7.5) relate to the future detailed design whereas the Project Design Report (Application Document 7.4) is a look back at the process leading to and informing the design.

14.1.4 The architecture and landscape design proposals have been developed in conjunction with independent design reviews by Highways England Design Review Panel (HEDRP), administered by the Design Council Commission for Architecture and the Built Environment.

14.1.5 To comply with DMRB GG 103 (Highways England, 2019a), a holistically integrated design is required to mitigate the effects of the Project as it adversely effects the surrounding landscape, including the removal of some archaeological remains and built heritage features and landscape effects on the Kent Area of Outstanding Natural Beauty (see ES Chapter 6: Cultural Heritage and ES Chapter 7: Landscape and Visual (Application Document 6.1) for further details about the impact of the Project on the surrounding environmental receptors). Therefore, the surrounding environment has been a key driver in developing the design, ensuring that, where practicable, significant structures sit contextually and sympathetically within the surrounding landscape and historic environment.

14.1.6 Materials in the design proposals have been selected to complement the landscape. A commonality of material palettes has been developed for both the North Portal and South Portal and contribute to a common design language of materials throughout the overall scheme (Clause PLA.03: Common Design Language, Design Principles, Application Document 7.5).

14.1.7 Structures would be functional, but respond positively and elegantly to the context, expressing the character and identity of the place. This would be achieved through the use of appropriate materials and traditions but would not make unnecessary superficial or superfluous visual statements (Application Document 7.5, Design Principles, Clauses STR.01 to STR.06).

14.2 Biodiversity Metric Calculations

DMRB GG 103 Requirement: E/1.25 When designing a project there shall be no net loss of biodiversity.

14.2.1 Biodiversity metric calculations have been made to assess the biodiversity unit value of the baseline conditions, and that forecast to be generated by the Project. The current assessment is based on the preliminary Project design as of August 2022 and uses the Biodiversity Metric 3.1 Calculation Tool (Natural England, 2022) to determine whether the Project could result in a net gain in biodiversity units. The Metric considers the significant adverse effects identified and outlined within ES Chapter 8: Terrestrial Biodiversity (Application Document 6.1) alongside the various measures that would be put in place to mitigate for this. Full details of the methodology, calculations and results are provided in Appendix 8.21: Biodiversity Metric Calculations (Application Document 6.3).

14.2.2 The landscape and ecology elements required for mitigation are outlined within the following Project documents:

a. Design Principles (Application Document 7.5)

b. Figure 2.4 Environmental Masterplan (Application Document 6.2)

c. Outline Landscape and Ecology Management Plan (oLEMP) (Application Document 6.7)

14.2.3 As a result of these landscape and ecology elements and those measures outlined in Chapter 8: Terrestrial Biodiversity, the Project would have a biodiversity net gain of 7% in biodiversity units.

DMRB GG 103 Requirement: E/1.25.1 In the longer term, the design should encourage gains in biodiversity.

14.2.4 As outlined within ES Chapter 8: Terrestrial Biodiversity (Application Document 6.1), an iterative appraisal of the Project design taking into account the design principles and good practice, was undertaken to identify any potentially significant effects that would require essential mitigation.

14.2.5 The route corridor has been designed to be a biodiverse wildlife corridor connecting suitable habitats throughout the wider landscape (see the Design Principles (Application Document 7.5), Clause PLA.05). South of the River Thames the landscape design provides a north-south link between the Thames, the marshes south of the river and the areas of ancient woodland around the A2/M2 (see Figure 2.4 Environmental Masterplan (Application Document 6.2)). North of the River Thames the landscape planting has been designed to provide a corridor between the M25 in the north-west, the Mardyke, the A13 and connecting to the Thames in the south-east.

14.2.6 In the vicinity of the Mardyke, the Project would include a viaduct with sufficient clearance height (proposed 4-5m headroom) to allow animals, (including bats and low-flying bird species such as barn owls) to commute below it, mitigating potential fragmentation effects. There would be a river bridge over the Orsett Fen Sewer, with the same clearance as the Mardyke viaduct. This river bridge is designed to accommodate farm vehicles as well as allowing for free passage of the Orsett Fen Sewer. It would therefore allow free movement of species beneath the bridge (see the Design Principles (Application Document 7.5), Clauses PLA.05, STR.08, STR.01, STR.04, STR.06, S12.03, S12.04, S12.05).

14.2.7 Biodiversity connectivity would be maintained by crossings of the Project by seven mixed-use green bridges. Green bridges have been individually designed to provide the greatest benefit at each particular crossing location (see Figure 2.4 Environmental Masterplan (Application Document 6.2)).

14.2.8 The approach to compensatory woodland planting to offset impacts to ancient woodland would focus on creating more woodland habitat which forms links between existing woodlands within the wider landscape. This would not only increase the extent of woodland habitat, which would support a range of protected and notable species, but build resilience into the wider habitat network, facilitating the ease of movement for protected species within the landscape.

14.2.9 Further details regarding the proposed woodland planting are provided on Figure 2.4 Environmental Masterplan (Application Document 6.2) and in the Design Principles (Application Document 7.5), Clauses LSP.15, LSP.19, S1.08, S1.14, and S2.01. This connectivity would be further enhanced by the green bridge designs described above.

14.2.10 North of the River Thames the new habitats have been designed to connect existing biodiverse areas, particularly the Thames Estuary and the Mardyke. To achieve this, a number of 'stepping-stone' areas of habitat creation are proposed. Within these areas the habitat would comprise an open mosaic habitat, with a mix of grassland, scrub, bare ground and ponds, with structural diversity and south-facing slopes and banks to create the most diverse habitat suitable for multiple species and groups. These habitats would act as areas from which species can disperse and colonise the Project landscape design and the wider landscape following the completion of construction (Figure 2.4 Environmental Masterplan (Application Document 6.2) and the Design Principles, Clause LSCP.22 (Application Document 7.5). To the north of the River Thames, the Project would primarily be either in cutting or false cutting, with the proposed habitat creation measures comprising a mix of grassland, with areas of scrub/hedgerow and tree planting (see Figure 2.4 Environmental Masterplan (Application Document 6.2)). In areas where grassland would be created, the species mix would be herb-rich and focused on locally prevalent species that would benefit local invertebrate populations (see the Design Principles (Application Document 7.5), Clauses PRO.04, PLA.05, LSP.02, LSP.04, LSP.09). This would support the Project becoming a wildlife corridor linking the areas around the Thames Estuary to the A13, Mardyke and M25 corridors.

14.3 Light pollution

DMRB GG 103 Requirement: E/1.26 Design shall seek to limit the impact of light pollution resulting from the road network.

14.3.1 The primary purpose of providing highway lighting is to improve safety and reduce personal collision injuries. However, recent studies have shown that removing or reducing the lighting levels has not always resulted in an increase in personal collision injuries. This, coupled with Government initiatives to reduce energy consumption, means that new highways are effectively assumed to be unlit and lighting has to be justified, where traditionally it has been the other way round.

14.3.2 The areas that have been identified as requiring lighting were assessed using the criteria in BS 5489 (British Standards Institution, 2020), and European Technical Report EN 13201 - Road lighting (European Standards, 2015) to establish a lighting class. This class provides the lighting values that need to be achieved. The selection criteria include several key factors including the following:

a. Traffic volumes

b. Road type (e.g. dual carriageway)

c. Junction density

d. Environmental zone (how dark or bright is the surrounding area)

e. A risk assessment of the area directly adjacent to the highway

Section lighting

14.3.3 The Institution of Lighting Professionals' (2020) Guidance Notes on the Reduction of Light Pollution – Guidance Note 01/20 classifies areas into Environmental Zones based on the ambient 'artificial' lighting level. This guidance was used to assess the Project route as outlined in paragraphs 14.3.4 to 14.3.8.

Mitigation into the design

14.3.4 The Institution of Lighting Professionals provides a simple mantra to use with all lighting designs: '*The right light, at the right time, in the right place*'. With highways lighting this means not over-lighting an area, ensuring light spill is reduced by focusing light onto the highway surface and where practicable, dimming the light levels when traffic flows reduce (e.g. at 02:00 in the morning).

14.3.5 LEDs are the only light source considered for new lighting designs. These have a number of sustainability benefits in comparison to high-pressure sodium or other common street light types including lower maintenance, greater life expectancy, better light quality, low energy consumption and typically a recycling rate of greater than 95%.

14.3.6 Lighting column heights would be kept as low as practicable, while still maintaining a design which complies with the lighting targets set by the lighting class (Application Document 7.5, Design Principles, clauses LST.02, LST.03 and S11.03).

14.3.7 By keeping the column heights low, increasing the column-to-column spacings, and not tilting luminaires, the daytime visual impact would be reduced to a minimum.

14.3.8 Mitigation for impacts on the human population as a result of highways lighting would not be required as any properties close enough to the route to be affected already lie in areas that are artificially lit.

15 Be shaped by the opinions of communities and road users

15.1 Stakeholder engagement

DMRB GG 103 Requirement: E/1.27 Stakeholders shall be engaged to help shape the approach to sustainable development incorporated into the design.

15.1.1 A detailed and comprehensive stakeholder engagement programme has been undertaken since 2013 when the Department for Transport held a non-statutory public consultation exercise for three main route options. Details of engagement and consultation are presented in the Consultation Report (Application Document 5.1) and the Statement of Engagement (Application Document 5.2).

15.1.2 The impact on communities, the surrounding environment and the local economy has been at the centre of the stakeholder engagement programme. Stakeholder responses have been important in developing and refining the design of the Project so it has a better impact on the communities, the surrounding environment and the local economy; and therefore, is more sustainable.

15.1.3 Examples of where the findings of the consultation and engagements impacted on a more sustainable design include the following:

a. At the M2/A2/A122 Lower Thames Crossing junction, landscaping proposals have included further detail on the proposed ancient woodland mitigation and compensation planting.

b. Utilities diversions around the A2 have been amended to reduce the impacts on environmentally sensitive areas.

c. Improvements to landscaping at tunnel entrances to integrate equipment into the landscape.

d. Two new woodland areas near Baker Street in Thurrock would be made publicly available.

e. A new footbridge would be created across the A127 to link existing footpaths.

f. Increasing the amount of open space south of the river by adding land to the east of Chalk Park.

15.2 Stakeholder engagement and diversity

DMRB GG 103 Requirement: E/1.28 Stakeholder engagement shall appropriately reflect the diversity of the area in which a project is to be delivered.

E/1.29 Stakeholder engagement shall involve people with protected characteristics who may be affected by designs.

15.2.1 To ensure that stakeholder engagement reflected the diversity of the area and the needs of those with protected characteristics, specific provisions were included in the plans for stakeholder engagement (see the Consultation Report, Application Document 5.0). Activities were carried out to ensure engagement reflected the diversity of the area and addressed those with protected characteristics, in addition to the main statutory and non-statutory consultations, are described below.

15.2.2 Six community focus groups were held following mapping exercises carried out in 2019. These were intended to understand the activities of vulnerable people living close to the Project, explore how their travel might be affected and to discover what differences there might be between the views of vulnerable and non-vulnerable audiences. These focus groups included young jobseekers; older people; Black, Asian and minority ethnic individuals; parents with young children; and people with disabilities.

15.2.3 The Project planned and implemented a series of additional events that made use of a Mobile Information Centre. A National Highways branded mobile exhibition centre, with display material and staff on hand to hold discussion with attendees, carried out numerous visits across the areas in 2019.

15.2.4 A Disabled Road Users Forum met up in March 2020 to engage with disability and mobility groups with a specific purpose of understanding the concerns of these road users, regarding the use of tunnels. The purpose was to understand how best the Applicant could communicate safety advice and importantly to specify relevant safety features within the tunnels. This gave information with the objective of developing an evacuation strategy in the event of an emergency.

15.2.5 The Project potentially impacts a number of traveller and gypsy communities along its route. These include the Gammonfields Way travellers' site located to the west of Baker Street in Thurrock as well as a number of private travellers' sites in Gravesham, Thurrock and Havering. Engagement has taken place with members of the community living at these sites to raise awareness of the Project proposals and to help inform the Project as relevant (for example extensive engagement with residents of the Gammonfields Way travellers' site has helped to inform design of a replacement site on adjoining land).

15.2.6 In addition to these activities, a Health and Equalities Impact Assessment (Application Document 7.10) and a Distributional Impact Assessment (Application Document 7.7) has been carried out which addressed vulnerable populations including children and young people; older people; low-income households; economically inactive people; those with disabilities; Black, Asian and minority ethnic groups (including travellers); religious groups; and people living in rural or isolated areas.

15.2.7 In summary, a detailed and comprehensive stakeholder consultation has been undertaken. The views of all respondents to the consultations have been reviewed and commented on using a thorough process of collation, categorisation and expert response. Many of these views have impacted on the design and are reflected in, for example, the detailed proposals to improve connectivity for active transport across the route.

16 Concluding statement

16.1.1 The aim of this Sustainability Statement has been to provide a response to the requirements of DMRB GG 103, thereby demonstrating how in-depth consideration has been given to sustainability throughout the design and planning process for the Project. Through exhibiting consistency with requirements E/1.3-E/1.29, the Project has demonstrated compliance with E/1.1:

'In meeting the goals of sustainable development projects shall demonstrate consistency with the requirements and advice in Sections E/1 and relevant requirements and advice in the Design Manual for Roads and Bridges.'

16.1.2 Furthermore, the consideration of, and cross reference to the various economic, environmental and other assessments that form part of the DCO application has demonstrated compliance with the final requirement of DMRB GG 103 – namely, E/1.2 which states that:

'Where available, information gathered from economic, environmental and other assessments associated with the project shall help inform the design response to sustainable development.'

16.1.3 Thus, this Sustainability Statement illustrates how the Project addresses the overarching goals of sustainability and the associated requirements outlined in DMRB GG 103 (Highways England, 2019a).

16.1.4 Within The Applicants' licence (DfT, 2015), sustainable development is defined as *'encouraging economic growth while protecting the environment and improving safety and quality of life for current and future generations*'. As outlined within Section 6, the Project will encourage economic growth through improvements in connectivity. Whilst it is recognised that there are likely significant effects on the environment as a result of the Project, Section 14, and the Environmental Statement (Application Document 6.1) more widely, outlines the extensive mitigation measures that are proposed to reduce or offset those effects. Section 4 outlines how safety has been embedded into the design review processes, allowing the Project to go beyond compliance with the Applicant's 'Home Safe and Well' (Highways England, 2019b) to ensure safe journeys for road users far into the future, eliminating risk at source where practicable. Through the use of the requirements of DMRB GG 103 (Highways England, 2019a), this Sustainability Statement is able to demonstrate compliance with 'sustainable development' as interpreted by National Highways' licence.

16.1.1 As the Project enters the later stages of detailed design and begins interactions with the Contractors, further opportunities to maximise sustainability will arise that, at this stage, are unable to be explored. The Contractors taking on the detailed design and construction phases are expected to build on this work to ensure that the Project is completed in a manner that satisfies the requirements of DMRB GG 103.

16.1.2 CEEQUAL (recently rebranded BREEAM Infrastructure) is the international evidence-based sustainability assessment, rating and awards scheme, used to promote continuous sustainability improvement in civil engineering projects (BRE, 2022). The Contractors are required to achieve a CEEQUAL standard for the whole project of Very Good and support the Client in achieving a Project standard of 'Excellent'. This is a secured commitment and included in the Code of Construction Practice First Iteration of Environmental Management Plan (Application Document 6.3). This commitment would promote the adoption of a wide range of sustainable outcomes, the results of which will be made public.

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Glossary

Term	Abbreviation	Explanation
Alignment		The horizontal (lateral) or vertical (height) position of a road. It can be defined by a series of horizontal tangents and curves or vertical crest and sag curves, and the gradients connecting them.
Air Quality Strategy	**AQS**	A strategy defined by the Government for improving air quality in the UK in the medium term.
Air Quality Strategy Objective	**AQSO**	An objective set by the Air Quality Strategy for England, Scotland, Wales and Northern Ireland to improve air quality in the UK in the medium term. Objectives are focused on the main air pollutants to protect health.
Area of Outstanding Natural Beauty	**AONB**	Statutory designation intended to conserve and enhance the ecology, natural heritage and landscape value of an area of countryside.
Biodiversity unit		A nominal figure that rates the distinctiveness, condition and size of a habitat. Biodiversity units are not an actual value, but help ecologists assess whether habitat interventions will increase or reduce biodiversity.
Department for Environment, Food and Rural Affairs	**DEFRA**	The government department responsible for environmental protection, food production and standards, agriculture, fisheries and rural communities in the UK.
Department for Transport	**DfT**	Department for Transport: the government department responsible for the English transport network and a limited number of transport matters in Scotland, Wales and Northern Ireland that have not been devolved.
Distributional Impact	**DI**	Considers the variance of transport intervention impacts across different social groups. The analysis of DIs is mandatory in the appraisal process and is a constituent of the Appraisal Summary Table (AST).
Design Manual for Roads and Bridges	**DMRB**	A comprehensive manual which contains requirements, advice and other published documents relating to works on motorway and all-purpose trunk roads for which one of the Overseeing Organisations (National Highways, Transport Scotland, The Welsh Government or the Department for Regional Development (Northern Ireland)) is highway authority. For the Lower Thames Crossing the Overseeing Organisation is National Highways.
Designers' Risk Management Tool	**DRMT**	This is part of Construction Design and Management at LTC. The DRMT demonstrates the application of principles of prevention and ensures risks that are considered by the Designers as being unusual, difficult to manage or risks that may not be apparent to an experienced Contractor are communicated. The process coordinates the risks with BIM and GIS. The Hazards included include health hazards associated with the contaminated ground for preliminary design. During detailed design, the Contractor is expected to use digital technology including clash detection federated designs to review foreseeable risks and integrate occupational health risks including temporary and permanent works.

Term	Abbreviation	Explanation
Environment Agency	**EA**	A Non-Departmental Public Body of Defra, established under the Environment Act 1995. It is the leading public body for protecting and improving the environment in England and Wales. The organisation is responsible for wide-ranging matters, including the management of all forms of flood risk, water resources, water quality, waste regulation, pollution control, inland fisheries, recreation, conservation and navigation of inland waterways.
Health and Equalities Impact Assessment	**HEqIA**	A systematic process used to identify the potential health and equalities impacts arising from policies, plans, programmes and projects, to identify the distribution of those effects amongst the population and to identify mitigation measures to address these effects, thereby minimising adverse effects on the local population.
Heavy Goods Vehicle	**HGV**	A large, heavy motor vehicle used for transporting cargo.
Health and Safety Executive	**HSE**	The government body responsible for health and safety regulation in Great Britain.
International Road Assessment Programme	**iRAP**	A registered charity dedicated to saving lives by eliminating high risk roads throughout the world.
Lead Local Flood Authority	**LLFA**	LLFAs are county councils and unitary authorities. They lead in managing local flood risks (i.e. risks of flooding from surface water, ground water and ordinary (smaller) watercourses). This includes ensuring co-operation between the Risk Management Authorities in their area. The LLFA for the M25 area is Essex County Council who is acting on behalf of Thurrock.
Lifecyle Assessment	**LCA**	A technique for assessing the environmental aspects associated with a product over its life cycle.
Light-emitting diode	**LED**	A semiconductor light source that emits light when current flows through it.
NPPF		National Planning Policy Framework: published in March 2012 by the UK's Department of Communities and Local Government, consolidating over two dozen previously issued documents called Planning Policy Statements (PPS) and Planning Policy Guidance Notes (PPG) for use in England. The National Planning Policy Framework was updated in 2021 by the Ministry of Housing, Communities and Local Government.
NPS		National Policy Statements, setting out UK government policy on different types of national infrastructure development, including energy, transport, water and waste. There are 12 NPSs, providing the framework within which Examining Authorities make their recommendations to the Secretary of State.
NPSNN		National Policy Statement for National Networks: The NPSNN sets out the need for, and Government's policies to deliver, development of nationally significant infrastructure projects on the national road and rail networks in England. It provides planning guidance for promoters of nationally significant infrastructure projects on the road and rail networks, and the basis for the examination by the Examining Authority and decisions by the Secretary of State.

Term	Abbreviation	Explanation
NSIP		Nationally Significant Infrastructure Project: major infrastructure developments in England and Wales, such as proposals for power plants, large renewable energy projects, new airports and airport extensions, major road projects etc. that require a development consent under the Planning Act 2008.
Particulate Matter 10	**PM10**	Particulate matter with a diameter between 2.5 and 10 micrometres.
Project		A122 Lower Thames Crossing: a proposed new crossing of the Thames Estuary linking the county of Kent with the county of Essex, east of the existing Dartford Crossing.
Safety Control Review Group	**SCRG**	The SCRG provides a forum for reviewing and accepting 'safety work' in accordance with the requirements set out in the DMRB. This ensures that the Project identifies, mitigates and manages safety risk.
Strategic Road Network	**SRN**	The core road network in England managed by National Highways.
Transport Analysis Guidance	**TAG**	National guidance document produced by the Department for Transport.
UK Climate Projections 2018	**UKCP18**	Probabilistic UK climate projections published in 2019. UKCP18 uses cutting-edge climate science to provide updated observations and climate change projections out to 2100 in the UK and globally. The project builds upon UKCP09 to provide the most up-to-date assessment of how the climate of the UK may change over the 21st century.
Water Flood Directive	**WFD**	Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy. The Directive establishes a framework for the protection of inland surface waters, estuaries, coastal waters and groundwater. The framework for delivering the WFD is through river basin management planning. The UK has been split into several river basin districts. Each river basin district has been characterised into smaller management units known as water bodies. The surface water bodies may be rivers, lakes, estuary or coastal.

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