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Department for Transport

Project

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NATIONAL NETWORKS NATIONAL POLICY STATEMENT

AOS APPENDIX 2 – SCOPING REPORT

CONTENTS

1. INTRODUCTION

1.1 This report

This report is the updated version of the AoS scoping report for the National Networks National Policy Statement (NNNPS). The original scoping report was subject to consultation with key environmental and sustainability organisations in March 2022. A range of responses was submitted and where appropriate these responses have been taken into account in this updated version of the report.

1.2 The National Networks National Policy Statement

The National Networks National Policy Statement (NNNPS):

- Sets out the need for (and Government's policies to deliver) development of nationally significant infrastructure projects (NSIPs) on the national road and rail networks (including Strategic Rail Freight Interchanges) in England; and
- Provides planning guidance for promoters of NSIPs, and the basis for their examination by the Examining Authority and decisions by the Secretary of State.

The current NNNPS was published in in December 2014. The Secretary of State (SoS) for Transport has concluded that the policy should be reviewed to align with the Government commitment to net zero, carbon budget 6[1] and the Transport Decarbonisation Plan (DfT, 2021)[2]. This review of the NNNPS also provides an opportunity to update other aspects of the document and ensure that it continues to provide a relevant policy framework for planning decisions.

1.3 Appraisal of Sustainability

The main purpose of an Appraisal of Sustainability (AoS) is to:

- Examine the likely social, economic and environmental effects of designating an NNNPS (and the reasonable alternatives to the NNNPS);
- Set out measures to mitigate any significant negative effects identified (and enhancement measures for all effects); and
- In this way help inform the preparation of the NNNPS to promote sustainable development.

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[1] https://www.theccc.org.uk/publication/sixth-carbon-budget/
[2] Transport decarbonisation plan - GOV.UK (www.gov.uk)

AoS is a requirement of the [Planning Act 2008](#). It also incorporates the requirements of the [Environmental Assessment of Plans and Programmes Regulations 2004](#) ("the SEA Regulations").

This report sets out the work carried out for the scoping stage of the NNNPS AoS. The purpose of scoping is to decide (and consult) on "the scope and the level of detail of the assessment".[3] This is done through collection of information in relation to National Networks and sustainability. This information is then used to set the scope and level of detail of the assessment which is outlined in an AoS framework.

1.4   Structure of the AoS scoping report

The structure of this report is as follows:

- Chapter 2: Approach to the AoS – this chapter provides the regulatory background, the approach to AoS generally and the AoS scoping stage in more detail;
- Chapters 3 to 19: These chapters are topic based and set out the key policy and legislative drivers, baseline data and sustainability issues related to each sustainability topic, as follows:

[3] SEA Regulations, Part 3, Section 12 (5) "When deciding on the scope and level of detail of the information that must be included in the report, the responsible authority shall consult the consultation bodies."

Table 1-1 Sustainability topics explored

Chapter	Topics
Greenhouse Gas Emissions	Greenhouse Gas Emissions
Natural Environment	Biodiversity and geodiversity
Neighbouring Communities	Air quality Climate change resilience Community impacts and access Heritage Landscape and townscape Noise and vibration
Economics	Critical infrastructure and security Macro-economic impact Levelling-up
Resources	Water resources Soil, land, minerals & agriculture Circular economy
Transport Users	User experience Safety

- Chapter 20: AoS Framework – this chapter sets out the framework that will be used to appraise the effects of the NNNPS.
- Chapter 21: Next Steps – provides information on the next steps.

A clear and focused approach to scoping has been taken as part of the AoS, to ensure that the data collection is appropriate to the scoping stage and is clearly presented to consultees (noting that the SEA Regulations require the *relevant* aspects of the current state of the environment be reported). The purpose of the AoS scoping report is to collect the data which is appropriate to the decisions that will be taken at the scoping stage, with regard to the coverage and level of detail of the assessment. The baseline data collected is commensurate with the aim of identifying sustainability issues which should be scoped into the AoS, and of establishing the relevant baseline to assess against, taking account of the strategic nature of the assessment. The fundamentals of the approach are explained in the box below.

> ## *THE APPROACH TO SCOPING*
>
> - A ***short, focused*** scoping report that presents the data necessary to decide upon the scope and level of detail of the assessment
> - Establishment of an AoS framework which addresses those ***sustainability issues of most relevance to the NNNPS***
> - A ***topic-based presentation*** of data which make it easier for consultees to understand the logic behind scoping decisions made
> - ***Further targeted data collection*** may be necessary at the impact assessment stage, but this will be directly related to the judgements that are being made for the assessment

1.5   Consultation

Consultees were invited to consider the following questions:

1: Do you consider that the range of sustainability issues covered is appropriate for the strategic non-spatial NNNPS?

2: Should any additional AoS criteria or sub-criteria be included?

3: Do you have any additional feedback on the AoS Scoping Report?

2.   APPROACH TO THE AOS

2.1   AoS process

The AoS process is based on a number of published guidance documents (note that there is no specific guidance on preparing an AoS):

- Sustainability Appraisal (SA) of Regional Spatial Strategies and Local Development Documents - Guidance for Regional Planning Bodies and Local Planning Authorities, by the former Office of the Deputy Prime Minister (ODPM), the Scottish Executive, the Welsh Assembly Government and Northern Ireland Department of the Environment November 2005;
- A Practical Guide to the Strategic Environmental Assessment Directive, by the ODPM, the Scottish Executive, the Welsh Assembly Government and the Northern Ireland Department of the Environment, September 2005; and
- Revised National Planning Policy Framework, July 2018 and associated Planning Practice Guidance, March 2014.

All work on the AoS will be in compliance with relevant English regulations, in this case the Environmental Assessment of Plans and Programmes Regulations 2004 (SEA regulations).

The AoS of the NNNPS will be carried out in a staged approach. Figure 2.1 outlines the stages of the AoS and the associated reporting requirements. These stages are described in textual form in the remaining parts of this section. HRA is being undertaken in parallel to the AoS and its results incorporated into the AoS as appropriate.

A more detailed breakdown of the scoping process is shown in Table 2-1.

2.2   Spatial and temporal scope of the AoS

The spatial scope of the AoS is broadly the same as that of the NNNPS, which covers England. However, it is considered that the NNNPS could result in some intra-UK impacts (on Scotland and Wales) and these will be addressed in the assessment, where applicable.

With regard to the temporal scope, the AoS will look at impacts over the following timescales:

- Short term (0-5 years);
- Medium term (5-10 years);
- Long term (10-20 years); and
- Longer term (20 years+).

Figure 2-1 The AoS Process
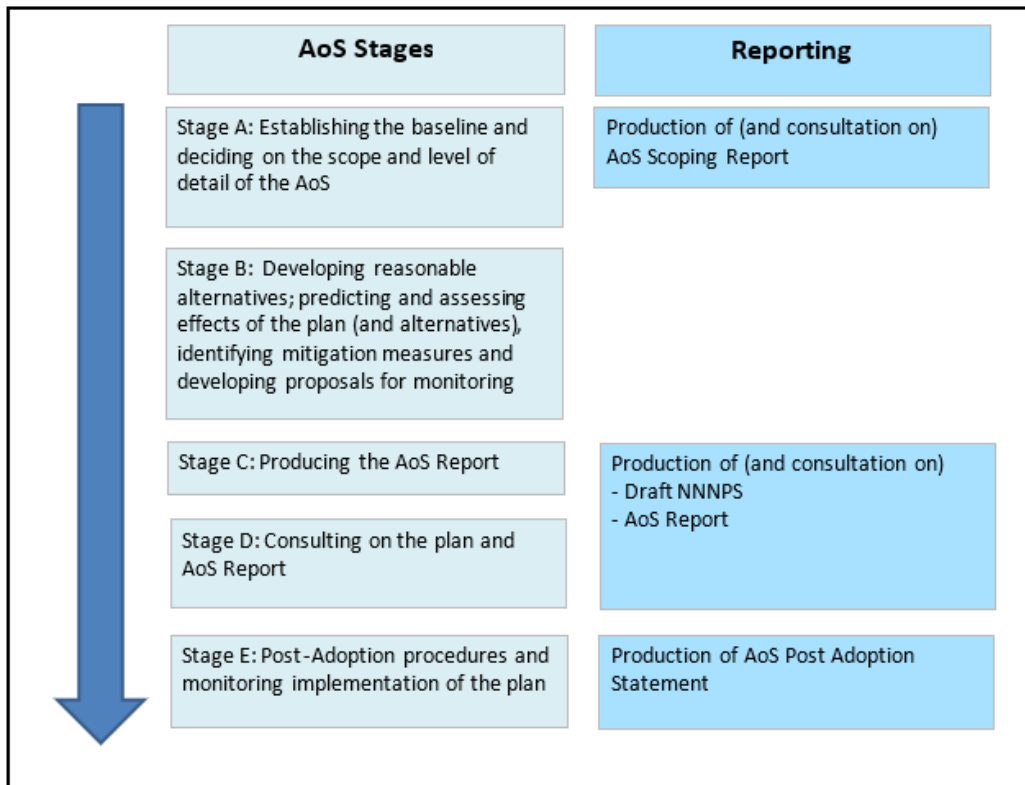
Figure 2.1 outlines the stages of the AoS and the associated reporting requirements.

Table 2-2 The AoS Scoping Process

Scoping stage	Purpose	What the SEA regulations say
A1 - Identify other relevant policies, plans, programmes and sustainability objectives	Identifies relevant environmental and wider sustainability policies, plans, programmes and sustainability objectives that the NNNPS should be working towards. This ensures that the assessment is measuring the NNNPS against the important environmental and sustainability policies, plans, programmes and sustainability objectives it should be helping to achieve.	The SEA Regulations require the AoS report (i.e., the report that outlines the result of the assessment) to set out: • An outline of the contents and main objectives of the plan or programme and of its relationship with other relevant plans and programmes' (Schedule 2, paragraph 1). • The environmental protection objectives, established at international, Community or national level.[4], which are relevant to the plan or programme and the way those objectives and any environmental considerations have been taken into account during its preparation' (Schedule 2, paragraph 5).
A2 - Collect baseline information	Identifies the relevant aspects of the state of the environment (and sustainability factors) and how the NNNPS could influence these factors (and therefore, what the scope of the assessment should be).	The SEA Regulations require the AoS report to include information on: • The relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the plan or programme. (Schedule 2, paragraph 2).

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[4] The use of the word Member State has been replaced by the word national by *Environmental Assessments and Miscellaneous Planning (Amendment) (EU Exit) Regulations 2018.*

Scoping stage	Purpose	What the SEA regulations say
		• The environmental characteristics of areas likely to be significantly affected (Schedule 2, paragraph 3).
A3 - Identify key sustainability issues	The identification of issues (both positive and negative) brings together information on the policy review and baseline data review and helps ensure that the relevant issues are addressed as part of the assessment (through setting the AoS framework). [5]	The SEA Regulations require the AoS report to include information on: • Any existing environmental problems which are relevant to the plan or programme including, in particular, those relating to any areas of a particular environmental importance, such as a European site (within the meaning of regulation 8 of the Conservation of Habitats and Species Regulations 2017). [6]
A4 - Develop the AoS framework	The AoS framework is a set of sustainability criteria that the plan will be assessed against and effectively sets the scope of the assessment.	The SEA Regulations (see Schedule 2 of the regulations) require the assessment to address a number of issues such as biodiversity, population, human health, fauna, flora, soil, water, air, climatic factors, material assets, cultural heritage, including architectural and archaeological heritage and landscape.

[5] As the detail of the coverage of the NNNPS is not yet available, we have been deliberately broad in this section and identified issues that may *potentially* be relevant to the NNNPS.

[6] Please note that there have been minor changes to the way that a European site is referenced due to the *Environmental Assessments and Miscellaneous Planning (Amendment) (EU Exit) Regulations 2018.*

Scoping stage	Purpose	What the SEA regulations say
		All of these issues are addressed in the AoS framework.

2.3 Habitats Regulations Assessment

Alongside the AoS, Habitats Regulations Assessment (HRA) will be carried out on the NNNPS.

In England and Wales, under the [Conservation of Habitats and Species Regulations 2017](#) (as amended).[7] (the 'Habitats Regulations') an 'Appropriate Assessment' is required to be undertaken on proposed plans or projects which are not necessary for the management of the European site, but which are likely to have a significant effect on one or more European sites either individually, or in combination with other plans or projects.

European sites include Special Areas of Conservation (SACs), originally designated under [European Council Directive 92/43/EEC](#) (referred to as the Habitats Directive), and Special Protection Areas (SPAs), originally designated under the [Conservation of Wild Birds Directive (Council Directive 2009/147/EC](#) (which codifies Directive 79/409/EEC)) for rare, vulnerable and regularly occurring migratory bird species and internationally important wetlands. As a matter of Government policy, listed or proposed Ramsar sites, potential SPAs (pSPA), candidate SACs (cSAC) and sites identified, or required, as compensatory measures for adverse effects on habitats sites, pSPAs, cSACs and listed or proposed Ramsar sites, are treated in the same way as European Sites. Hereafter, all the above sites are referred to as European sites.

It is important to note that the HRA Regulations require assessment of the NNNPS as a plan and as such the HRA will be undertaken on that basis – this does not remove the requirement for detailed project level HRA to be undertaken at development consent stage.

Although the AoS and HRA are separate legislative processes, they are being undertaken by the same team and results from the HRA will inform the AoS when making an assessment of the effects of the NNNPS on European sites.

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[7] Following the changes made to the Conservation of Habitats and Species Regulations 2017 (as amended) by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019, Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) in the UK no longer form part of the EU's Natura 2000 ecological network and now form part of the UK's national network of European Sites. In this document they are still referred to as European Sites.

3. GREENHOUSE GAS EMISSIONS

3.1 Key policy and legislative drivers, objectives and targets relevant to the NNNPS

- **Climate Change Act 2008** [8] **and 2050 Target Amendment Order (2019)** [9]: Target to reach net zero by 2050. Requires five-yearly carbon budgets.
- **UK Carbon Budgets:** Carbon budgets based on reduction in GHG emissions: fourth (2023-2027, 1,950 $MtCO_2e$) [10] and fifth (2028-2032, 1,725 $MtCO_2e$) [11]. Carbon budgets based on net zero by 2050: sixth carbon budget (2033-2037, 965 $MtCO_2e$) [12].
- **Net Zero Strategy[13]:** Build Back Greener (2021): The ten point plan for a green industrial revolution lays the foundations for a green economic recovery from the impact of COVID-19. This strategy builds on that approach to keep us on track for UK carbon budgets, our 2030 Nationally Determined Contribution (Nationally Determined Contribution for 2030 of a 68% reduction made pursuant to the Paris Agreement), and net zero by 2050. Aside considering the impacts of transport related emissions, the Strategy also sets out the importance of halting deforestation as critical to halting the climate crisis.
- **Decarbonising transport: a better, greener Britain (2021)** [14]**:** Sets 78 commitments to decarbonise all forms of transport. NNNPS should align with these commitments to facilitate decarbonisation of transport, for example:
  - Net zero railway network by 2050.
  - Removal of all diesel-only trains (passenger and freight) by 2040.
  - Consultation to deliver petrol and diesel phase out dates for new vehicles.
  - Delivery of world class cycling and walking network in England by 2040.
- **Transitioning to zero emissions cars and vans: 2030 delivery plan (2021)** [15]: Key measures include:
  - End of sale of all new petrol and diesel cars and vans by 2030.
  - All new cars and vans fully zero emission at the tailpipe by 2035.

[8] UK Government (2008) Climate Change Act 2008. Available at: https://www.legislation.gov.uk/ukpga/2008/27/contents [Accessed 18/02/2022].

[9] UK Government (2019) Climate Change Act 2008 (2050 Target Amendment) Order 2019. Available at: https://www.legislation.gov.uk/uksi/2019/1056/contents/made [18/02/2022].

[10] UK Government (2011) The Carbon Budget Order 2011. Queen's Printer of Acts of Parliament. Available at: https://www.legislation.gov.uk/uksi/2011/1603/introduction/made [Accessed 18/02/2022].

[11] UK Government (2016) The Carbon Budget Order 2016. Queen's Printer of Acts of Parliament. Available at: https://www.legislation.gov.uk/uksi/2016/785/introduction/made [Accessed 18/02/2022].

[12] UK Government (2021) The Carbon Budget Order 2021. Queen's Printer of Acts of Parliament. Available at: https://www.legislation.gov.uk/uksi/2021/750/introduction/made [Accessed 18/02/2022].

[13] UK Government (2021) Net Zero Strategy: Build Back Greener. Available at: https://www.gov.uk/government/publications/net-zero-strategy [Accessed 18/02/2022].

[14] Department for Transport (2021) Decarbonising Transport: a better, greener Britain. Available at: https://www.gov.uk/government/publications/transport-decarbonisation-plan [Accessed 23/02/2022].

[15] Department for Transport and Office for Zero Emission Vehicles (2021) Transitioning to zero emission cars and vans: 2035 delivery plan. Available at: https://www.gov.uk/government/publications/transitioning-to-zero-emission-cars-and-vans-2035-delivery-plan [Accessed 24/02/2022].

- **National Planning Policy Framework (2021)** [16]: Role of planning policy in securing radical reductions in greenhouse gas (GHG) emissions for NSIPs. **Nationally Determined Contribution (2030)[17]:** On 12 December 2020, the UK communicated its new Nationally Determined Contribution (NDC) under the Paris Agreement to the United Nations Framework Convention on Climate Change (UNFCCC). The NDC commits the UK to reducing economy-wide greenhouse gas emissions by at least 68% by 2030, compared to 1990 levels.
- **Sixth Carbon Budget (2035)[18]:** On 20 April 2021, the UK set in law a climate change target, cutting emissions by 78% by 2035 compared to 1990 levels. This was in line with the recommendation from the UK Climate Change Committee for the sixth Carbon Budget and is intended to take the UK more than three-quarters of the way to reaching net zero by 2050 (from 1990 levels).
- **Committee on Climate Change Progress Report (2022)[19]:** There has been a minus 19% change in emissions form surface transport since in 2021. The key message was that tangible progress was lagging behind ambition and some sectors are unbale to reduce as required which means that other sectors such as transport will need to reduce emissions faster for the UK to stay within carbon budgets.

3.2 Baseline – sustainability context relevant to the NNNPS

In recent years, the UK has been significantly cutting its GHG emissions. In 2020, CO_2 accounted for ~79% of total UK GHG emissions. In 2020, UK GHG emissions were 406 $MtCO_2e$, 9.5% lower than in 2019 and 49.7% lower than in 1990 [20].

3.3 2019 UK Transport GHG Emissions [21, 22]

- Transport is the largest emitting sector in UK since 2016 and represents 27% of UK emissions, almost entirely through CO_2.
- Road transport is the most significant source of emissions in this sector, particularly passenger cars.

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[16] Ministry of Housing, Communities & Local Government (2021) National Planning Policy Framework. Available at: https://www.gov.uk/guidance/national-planning-policy-framework [Accessed 18/02/2022].

[17] https://www.gov.uk/government/publications/the-uks-nationally-determined-contributioncommunication- to-the-unfccc

[18] https://www.gov.uk/government/news/uk-enshrines-new-target-in-law-to-slash-emissions-by-78-by-2035

[19] 2022 Progress Report to Parliament - Climate Change Committee (theccc.org.uk)

[20] Department for Business, Energy and Industrial Strategy (2022) Final UK greenhouse gas emissions national statistics: 1990 to 2020 – statistical release. Available at: https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-to-2020 [Accessed 18/02/2020].

[21] Department for Business, Energy and Industrial Strategy (2021) Final UK greenhouse gas emissions national statistics: 1990 to 2019 – statistical release. Available at: https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-to-2019 [Accessed 18/02/2020].

[22] Department for Transport (2021) Rail Environment Policy Statement: On Track for a Cleaner, Greener Railway. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1002166/rail-environment-policy-statement.pdf [Accessed 18/02/2022].

- Transport emissions fell by 1.8% between 2018-2019 despite increased road traffic. This was the second year of falling emissions having previously risen since 2013 however, transport has not decarbonised at the same rate as other sectors (for example, energy sector).
- Emissions only fell by 4.6% between 1990-2019 as increased road traffic has largely offset improvements in vehicle fuel efficiency.
- Rail emissions comprised just 1.4% of the UK's domestic transport emissions.
- On average, rail freight trains emit around a quarter of the CO_2e emissions of HGVs, per tonne mile travelled.

3.4 2020 UK Transport GHG Emissions[20,22]

- Over half of the decrease in UK GHG emissions between 2019-2020 was from reduced transport emissions, which were down 19.2% due to large reductions in road transport use during nationwide lockdowns as part of the COVID 19 pandemic.
- Despite this decrease, transport remained the largest emitting sector in UK and represents 24% of UK emissions, almost entirely through CO_2.
- Railway emissions fell by 22%, again due to the COVID 19 pandemic. In 2019/20, emissions per passenger km were at their lowest level since 2011/12.
- In terms of regional differences, the following summarises 2019 regional and Local Authority (LA) transport GHG emissions.[23]:
    - London - lowest CO_2e per capita emissions of any region due to the urban nature of transport systems, a high population density and a smaller presence of large industrial facilities compared toother regions (meaning less freight transport).
    - Transport sector - highest share of end-user CO_2e emissions in 63% of LAs and accounts for > 50% emissions in 12% of LAs.
    - Decrease in transport emissions in ~83% of LAs since 2018 and in ~92% of LAs since 2005.

3.5 Emissions and Removals from Land-use[24]

- Land use changes including the conversion of land for development, can result in net annual emissions or removals of greenhouse gases.
- Net emissions from the Land Use, Land Use Change and Forestry (LULUCF) sector have changed from 13.1 Mt CO2e in 1990 to 3.7 Mt CO2e in 2020. This long-term fall has been driven by a reduction in emissions from grassland, cropland and settlements, and an increase in the sink provided by forest land, with an increasing uptake of carbon

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[23] Department for Business, Energy and Industrial Strategy (2021) UK local authority and regional carbon dioxide emissions national statistics: 2005 to 2019. Available at: https://www.gov.uk/government/statistics/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics-2005-to-2019 [Accessed 18/02/2022].

dioxide by trees as they reach maturity, in line with the historical planting pattern. There has also been some reduction in emissions since 1990 due to changes in agricultural practices.

- Methane is the dominant GHG emitted by the LULUCF sector in 2020.
- Cropland, remaining cropland and land converted to cropland are the dominant sources of GHG emissions, and forest land and remaining forest land are the dominant sink in 2020.

3.6 Key sustainability issues potentially relevant to the NNNPS

- Construction and operation of the national networks has an important role in decarbonising rail and road networks in England. With transport being the largest emitting sector in the UK, the NNNPS can facilitate the delivery of UK net zero targets. However, without adequate action net zero targets could be missed if emissions (especially emissions from road transport) do not fall significantly.
- The size of the road and rail estate, in addition to incorporating green and blue infrastructure along transport corridors, offers opportunities to help sequester carbon whilst meeting biodiversity net gain targets, improving air and water quality, as well as delivering health and well-being benefits.
- There opportunities should focus on reducing deforestation, as well as expanding tree and woodland cover to meet carbon targets.

4. BIODIVERSITY AND GEODIVERSITY

4.1 Key policy and legislative drivers, objectives and targets relevant to the NNNPS

- **Environment Act (2021)**[25]**:** In relation to biodiversity, the Act:
  - Will set statutory targets for the recovery of nature including a target to reverse the decline in species abundance by the end of 2030. Defra published target proposals for consultation in March 2022, these targets need to be laid as draft Statutory Instruments by 31 October 2022[26].
  - Mandates a minimum 10% biodiversity net gain for NSIPs. Defra began consultation on the regulations and implementation of biodiversity net gain in January 2022[27].

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[25] UK Government (2021) Environment Act 2021, 2021 c30. Available at: https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted [Accessed 25/02/2022].

[26] Defra (2022) Consultation on environmental targets - https://consult.defra.gov.uk/natural-environment-policy/consultation-on-environmental-targets/supporting_documents/Environment%20Targets%20Public%20Consultation.pdf – [Accessed 23.03.2022]

[27] Defra (2022) Consultation on Biodiversity Net Gain Regulations and Implementation - https://consult.defra.gov.uk/defra-net-gain-consultation-team/consultation-on-biodiversity-net-gain-regulations/supporting_documents/Consultation%20on%20Biodiversity%20Net%20Gain%20Regulations%20and%20Implementation_January2022.pdf – [Accessed 23.03.2022]

- o Requires Local Nature Recovery Strategies (LNRS) to be prepared for all areas of England. Defra went out for consultation on nature recovery in relation to protected sites and species in March 2022[28].
- o Amends a duty in the Natural Environment and Rural Communities Act[29] that requires public authorities to conserve and enhance biodiversity, rather than the current wording which only requires public authorities to conserve biodiversity.
- **National Planning Policy Framework (2021): Planning Guidance on Ancient Woodland**[30]**:** Planning permission must be refused (with some limited exceptions) if development will result in the loss or deterioration of ancient woodland, ancient trees and veteran trees (this also applies to other irreplaceable habitats).
- **Conservation of Habitats and Species Regulations (2017 and 2019 Amendment)**[31]**:** The 2019 Regulations have created a national site network within the UK territory comprising the protected sites already designated under the Nature Directives, and any further sites designated under these Regulations. The 2019 Regulations establish network objectives which are:
  - o To maintain or, where appropriate, restore habitats and species.
  - o To contribute to ensuring the survival and reproduction of wild birds and secure compliance with the overarching aims of the Wild Birds Directive.
- **Wildlife and Countryside Act (1981 as amended Countryside Rights of Way 2000)**[32]**:** Includes the powers to designate SSSIs and includes a general duty of for statutory bodies to conserve and enhance SSSIs.
- **Natural Environment and Rural Communities Act (2006)**[33]**:** Places a duty on all public authorities to have regard, in the exercise of their functions, to the purpose of conserving biodiversity. There are 56 habitats recognised as of 'principal importance' for the conservation of biological diversity in England under section 41 of the Act.
- **Environmental Improvement Plan (Formerly 25 Year Environment Plan (2018))**[34]**:** Represents the first improvement plan brought about by the Environment Act 2021 and sets out goals of improving the environment within a

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[28] Defra (2022) Nature recovery green paper: protected sites and species consultation - https://consult.defra.gov.uk/nature-recovery-green-paper/nature-recovery-green-paper/supporting_documents/Nature%20Recovery%20Green%20Paper%20Consultation%20%20Protected%20Sites%20and%20Species.pdf – [Accessed 23.03.2022]

[29] UK Government (2006) Natural Environment and Rural Communities Act 2006. Available at: https://www.legislation.gov.uk/ukpga/2006/16/contents [Accessed 18/02/2023].

[30] Ministry of Housing, Communities & Local Government (2021) National Planning Policy Framework. Available at: https://www.gov.uk/guidance/national-planning-policy-framework [Accessed 18/02/2022].

[31] UK Government (2017) The Conservation of Habitats and Species Regulations 2017 (2017 No. 1012). Available at: https://www.legislation.gov.uk/uksi/2017/1012/contents/made [Accessed 18/02/2022].

[32] UK Government (1981) Wildlife and Countryside Act 1981, 1981 c69. Available at: https://www.legislation.gov.uk/ukpga/1981/69/schedule/1 [Accessed 18/02/2022].

[33] UK Government (2006) Natural Environment and Rural Communities Act 2006, 2006 c16. Available at: https://www.legislation.gov.uk/ukpga/2006/16/contents [Accessed 18/02/2022].

[34] Department for Environment, Food & Rural Affairs and The Rt Hon Michael Gove MP (2018) 25 Year Environment Plan. Available at: https://www.gov.uk/government/publications/25-year-environment-plan [Accessed 02/03/2022].

generation including arresting the decline in native species and improving biodiversity.

- **Design and Manual for Roads and Bridges**[35]**:** Contains information about current standards relating to the design, assessment and operation of motorway and all-purpose trunk roads in the United Kingdom. Including relevant volumes on biodiversity, air quality and geology and soils.
- **Nature Recovery Green Paper: Protected Sites and Species (2022):** Set out in ambitions to restore nature and halt the decline in species abundance by 2030. It includes options to bring clarity and coherence to our framework for protected sites; to reform species protections; and to modernise funding arrangements. It also looks at what institutional and delivery arrangements would best support our nature recovery objectives.
- **The Economics of Biodiversity, The Governments response to the Dasgupta Review:** The Review makes clear the need to integrate nature into our measures of economic success in light of the vital role natural capital, and the biodiversity that underpins it, plays in our economies, livelihoods and well-being and underscores the need to integrate environmental principles into policymaking.

4.2 Baseline – sustainability context relevant to the NNNPS

4.2.1 General State of Biodiversity [36]

- The abundance and distribution of the UK's species has declined since 1970 and the rate of decline has been the greatest in the last decade. Since 1970:
  - 13% decline in average species' abundance.
  - 5% decline in average species' distribution.
  - 41% of species' have decreased in abundance.
  - It is suggested the UK will not meet most of the Convention on Biological Diversity's 2020 Aichi targets. Key drivers for this decline are agricultural management, climate change, pollution, urban management, woodland management, hydrological change, and invasive non-native species.

4.2.2 Designated Sites [37]

- In 2021 designated sites consisted of over 1 million hectares of terrestrial and freshwater areas, representing about 8% of the land area of England, and just under 2.5 million hectares of marine sites (out to the 12 nautical mile limit) which account for 47% of inshore waters around England.

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[35] National Highways (2020) Design Manual for Roads and Bridges (DMRB).
[36] NBN (2019) State of Nature Report. Available at: https://nbn.org.uk/wp-content/uploads/2019/09/State-of-Nature-2019-UK-full-report.pdf [Accessed 02/03/22].
[37] Department for Environment, Food & Rural Affairs (2021) Biodiversity 2020: A strategy for England's wildlife and ecosystem services. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1026846/England_biodiversity_indicators_2021_FINAL_REVISEDv3.pdf [Accessed 02/03/22].

- Between 1999 and 2021 the total extent of land and sea protected in England increased by 187%, from 1.2 million to 3.5 million hectares. The area of terrestrial and freshwater sites has remained relatively static since 1999, whereas the area of marine sites has increased substantially over the most recent 5 years; by 83% to 2021 and by 1% in the latest year.

4.2.3   Special Protection Areas[37]

- 88 Special Protection Areas (SPAs) across England (2.0 million hectares).
- 40% are in a favourable status, 50% are in unfavourable and recovering status, 3% are in unfavourable and no change status and 4% are in unfavourable and declining status.

4.2.4   Special Areas of Conservation[37]

- 256 Special Areas of Conservation (SACs) across England (5.6 million hectares).
- 35% are in a favourable status, 57% are in unfavourable and recovering status, 5% are in unfavourable and no change status and 3% are in unfavourable and declining status.

4.2.5   Ramsar Sites[37, 38]

- 73 Ramsar sites in England (~411,000 hectares).
- 57% are in a favourable status, 33% are in unfavourable and recovering status, 3% are in unfavourable and no change status and 6% are in unfavourable and declining status.

4.2.6   Sites of Special Scientific Interest[37, 39, 40, 41]

- A Site of Special Scientific Interest (SSSI) is one of the country's very best wildlife and/or geological sites. There are 4,127 SSSIs across England covering around 8% of the country's land area (1.1 million hectares).

[38] JNCC (2022) Ramsar Sites in the UK and the UK's Overseas Territories and Crown Dependencies.
[39] Department for Environment, Food & Rural Affairs (2021) Biodiversity 2020: A strategy for England's wildlife and ecosystem services. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1026846/England_biodiversity_indicators_2021_FINAL_REVISEDv3.pdf [Accessed on 02/03/22].
[40] National Highways (2019) Biodiversity Report 2018-19. Available at: https://nationalhighways.co.uk/media/2owaqcdd/biodiversity-report-2018-19.pdf [Accessed on 02/03/22].
[41] Network Rail (2020) Biodiversity Action Plan Available at: https://www.networkrail.co.uk/wp-content/uploads/2020/12/Network-Rail-Biodiversity-Action-Plan.pdf [Accessed on 02/03/22].

- As of 2021, there has been a net decrease in the area of SSSIs in favourable condition; down from 44.0% in 2003 to 38.4% in March 2021. This downward trend has slowed in the past 5 years.
- The area in unfavourable recovering condition has increased substantially from 13.0% in 2003 to 53.0% in 2021. The overall proportion of SSSIs in favourable or unfavourable recovering condition remained above the 95% target from 2011 to 2016 but has since fallen year-on-year to 91.4% in 2021.
- For those SSSIs in an adverse condition the five most common reasons for failure are associated with water pollution as a result of agricultural run-off, discharge, drainage and agricultural overgrazing. Note this data was not available for SPA, SACs and Ramsar sites.
- There are approximately 70 SSSIs on or adjacent to the Strategic Road Network, of which approximately 40 require intervention to achieve a favourable or recovering status.
- Network Rail owns and manages approximately 200 SSSIs, the status of these sites has not been publicly stated.

4.2.7   Priority Habitats[37]

- There are 1.87 million hectares of terrestrial and coastal priority habitats recorded in the 2013 priority habitats' inventory for England. These habitats represent around 14% of the total land area of the country but it is not currently possible to assess the extent to which this area changes from year to year.
- Deciduous woodland accounts for 39% of the priority habitats in England. Wetland habitats account for a further 29%, heathlands for 16%, and grasslands and coastal habitats for 7% each. Rarer habitats such as traditional orchards and limestone pavements together comprise 1% of the total resource.
- The area of priority habitats in target condition has decreased by 1.9% from a figure of 1.26 million hectares in 2016, to 1.23 million hectares in 2021.
- As of the 1st of April 2021, almost 1.23 million hectares of priority habitats were in target condition. This equates to 65.6% of all priority habitats in a favourable or unfavourable recovering condition. Note it is not possible to report the condition of some 31% of priority habitats that occur outside of SSSIs and that are not under Higher Level Stewardship (HLS) or Countryside Stewardship (CS) agreements or within Forestry Commission (FC) managed woodland.

4.2.8 Air quality impacts on biodiversity [42, 43, 44]

- Air pollution has been identified as a direct threat to biodiversity in England. Pollutants come from a range of different sources, but transport is known to be the single largest source of NOx emissions. It is projected that in 2020 the level of exposure to NOx from road traffic, in combination with other sources, will continue to be[45]:
    - High across a total of 3,822 hectares within 300 SSSIs and 1,172 hectares within 80 SACs.
    - Medium across a total of 6,019 hectares within 103 SSSIs and 2,133 hectares within 13 SACs.
- There is a substantial projected decline in the potential risk of impacts to SACs from NOx due to road traffic in combination with other sources between 2011 and 2020, it is anticipated that in 2020 there are 16 and 28 specific areas of SACs with High and Medium sensitivity (in comparison with 23 and 48), respectively, where baseline nitrogen deposition exceeds Critical Loads and exposure to NOx from road traffic in combination with other sources is High.
- Around 80% of sensitive European Natura 2000 sites (SACs and SPAs) and 90% of sensitive SSSIs in England exceed the benchmark levels (critical loads) for damaging effects of nitrogen deposition. The area of sensitive habitats (in England) where the critical load for nitrogen is exceeded is over 95%.
- Between 87-96% of designated sites in England receives ammonia concentrations above receive ammonia concentration above 1 µg m^{-3}. Ammonia is emitted in small amounts by vehicles with catalytic converters and roadside atmospheric concentrations are well below critical levels for this pollutant, thus unlikely to be a key issue.

4.2.9 Geodiversity [46, 47]

- There are currently three Geoparks in England, the English Riviera, located in the south of Devon in the South West, the North Pennines, between Cumbia and

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[42] Natural England (2016) The ecological effects of air pollution from road transport: an updated review. Available at http://publications.naturalengland.org.uk/publication/6212190873845760 [Accessed 25/02/2022].

[43] Natural England (2016) Potential risk of impacts of nitrogen oxides from road traffic on designated nature conservation sites. Available at http://publications.naturalengland.org.uk/publication/6331846246793216 [Accessed 02/03/2022].

[44] Rowe EC, Mitchell Z, Tomlinson S, Levy P, Banin LF, Sawicka K, Martín Hernandez C & Dore A (2020) Trends Report 2020: Trends in critical load and critical level exceedances in the UK. Report to Defra under Contract AQ0843, CEH Project NEC05708. Available at https://uk-air.defra.gov.uk/assets/documents/reports/cat09/2006181057_Trends_Report_2020.pdf [Accessed 01/05/2022].

[45] These figures are to be treated with caution, as they are from a study carried in 2016.

[46] United Kingdom National Commission for UNESCO (2021) Global Geoparks. Available: http://www.unesco.org.uk/designation/geoparks/ [Accessed 25/02/2022]

[47] Department for Environment, Food and & Rural Affairs (2022) G2: Condition of heritage features including designated geological sites and scheduled monuments. Available at https://oifdata.defra.gov.uk/7-2-1/#:~:text=There%20are%20currently%201%2C150%20SSSIs%20in%20England%20designated,the%20Secretary%20of%20State%20as%20being%20nationally%20important [Accessed 25/02/2022].

Northumberland in the North, and the Black Country located in the Midlands. There is also Dorset and East Devon Coast UNESCO World Heritage Site ('The Jurassic Coast'), which are globally important for the study of palaeontology and geomorphology.

- There are currently 1,150 SSSIs in England designated wholly, or in part, for their geology, encompassing 1,673 features identified through the Geological Conservation Review (GCR) sites.
- In total, 60% of all designated geological features have been assessed as in favourable condition. A further 8% have been assessed as unfavourable but recovering. Approximately 1% have been destroyed or partially destroyed.
- There are also a range of Regionally Important Geology Sites (RIGS) across England and Wales.
- Road transport can have an impact on the geology and the soils of an area, to manage such effects, projects must adhere to identifying and monitoring potential impacts on bedrock geology and superficial deposits, soil resources and contamination on human health, surface water and ground water. Enhancement opportunities could improve the condition of existing geological exposure or/and creating new geological exposures within design parameters and improving scientific data.

4.2.10 Key sustainability issues potentially relevant to the NNNPS

- Ensure BNG is designed into every scheme at the outset, taking into account how ecosystems are expected to change under climate change scenarios.
- Reducing severance and reconnecting historically severed areas of the natural environment would support a more coherent national biodiversity network especially in the light of the need to deliver nature recovery in the face of climate change. National networks should contribute in a positive way to deliver nature recovery avoiding severance and helping reconnection.
- Effective maintenance and monitoring should be clearly established as part of each NSIP to ensure that biodiversity commitments will be fulfilled in their entirety as part of the aftercare period (i.e., minimum 30 years of mandatory BNG).
- Delivery of wider environmental net gains relevant to the local area and those that support national priorities such as reductions in green-house gas emissions, reduced flood risk, improvements to air or water quality, or increased access to natural greenspace.
- National networks should explore the use of natured-based solutions and green infrastructure, to deliver climate change adaptation and other environmental and social outcomes, such as encouraging greater active travel and connect people with greenspaces.
- Where national networks intersects with designated sites including those with significant geodiversity, protected habitats (including irreplaceable habitats) and species, there is a need to balance infrastructure needs with protection and enhancement of those sites and their settings. In addition, there is a need for

effective protection measures to be in place for the soils that support these designated and protected sites.

- There is also a need for sites that are not in favourable condition to be better managed and ensure the SSSIs management plans are taken forward.
- Traffic growth can increase severance and mortality as much as a third of some species young are killed on every year and the noise from roads can impact some bird species.

5. AIR QUALITY

5.1 Key policy and legislative drivers, objectives and targets relevant to the NNNPS

- **Air Quality Standards Regulations (2010)** [48]: Sets limit values, target values and long-term objectives for ambient concentrations of outdoor pollutants (sulphur dioxide, nitrogen oxides (NO_x)), particulate matter (PM) $_{10}$ and $_{2.5}$, lead, benzene, carbon monoxide and ozone). Requires annual ambient air quality data reporting. NOx exceedances remain in many agglomerations, despite a legally binding target to end these by 2010. Particulate emissions are largely stagnant since 2010 and increasing levels and weight of traffic are likely to lead to an increase.
- **UK Air Quality Strategy (2007)** [49]: Established objectives for eight key air pollutants. These are at least as stringent as the limit values of the Air Quality Standards (AQS) Regulations.
- **Environment Act (2021)** [50]: Will strengthen existing legislation and introduce a duty to set a new legally binding ambient target for fine particulate matter ($PM_{2.5}$), the most damaging pollutant to human health, alongside one further long-term air quality target. Requires the Secretary of State to undertake regular 5-yearly reviews of the AQS. The first review will be published in 2023, as part of the review of the Environment Improvement Plan. [51]
- **Air Quality (England) Regulations 2000** [52]**:** Outlines national objectives for air quality which must be met by each relevant local authority (air quality is considered a devolved matter). If national objectives are not met, or at risk of not being met, the local authority must declare an air quality management area (AQMA).
- **Clean Air Strategy 2019** [53] : Policy action to reduce emissions of fine particulate matter (as $PM_{2.5}$), Ammonia (NH_3), Nitrogen oxides (NO_x), Sulphur dioxide (SO_2) and non-methane volatile organic compounds (NMVOCs).
- **Air Quality Plan for Nitrogen Dioxide in the UK (2017)** [54]: The UK is currently failing to meet the annual mean limit value for nitrogen dioxide (NO_2)

[48] UK Government (2010) The Air Quality Standards Regulations 2010. Available at: https://www.legislation.gov.uk/uksi/2010/1001/contents/made [Accessed 25/02/2022].

[49] Department for Environment, Food & Rural Affairs (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69336/pb12654-air-quality-strategy-vol1-070712.pdf. [Accessed 25/02/2022].

[50] UK Government (2021). Environment Act 2021, 2021 c30. Available at: https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted [Accessed 25/02/2022].

[51] Department for Environment, Food & Rural Affairs (2022) UK Air Information Resource. Available at: https://uk-air.defra.gov.uk/air-pollution/uk-eu-policy-context [Accessed 25/02/2022].

[52] UK Government (2000) The Air Quality (England) Regulations 2000 - https://www.legislation.gov.uk/uksi/2000/928/contents/made - [Accessed 23.03.2022]

[53] Department for Environment, Food & Rural Affairs (2019) Clean Air Strategy 2019. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/770715/clean-air-strategy-2019.pdf [Accessed 25/02/2022].

[54] Department for Environment, Food & Rural Affairs, Department for Transport (2017) UK plan for tackling roadside nitrogen dioxide concentrations. Available at: https://www.gov.uk/government/publications/air-quality-plan-for-nitrogen-dioxide-no2-in-uk-2017. [Accessed 25/02/2022].

concentrations. Sets out actions to achieve compliance supported by a £3.8 billion investment into air quality and cleaner transport including Clean Air Zones, three of which have been implemented in 2021 in Bath, Birmingham, and Portsmouth.

- **The UK Government's Public Health Outcomes Framework for England (2016 – 2019)**[55]: Reports on adult mortality attributable to long-term exposure $PM_{2.5}$. Provides estimates of the same per local authority area.

- **National Planning Policy Framework (2021)**[56]: Planning policies and decisions should contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement.

- **The Environment Act (2021)[57]:** Establishes a legally binding duty on government to bring forward at least two new air quality targets in secondary legislation by 31 October 2022. The proposed air quality targets for Pm 2.5 are Annual Mean Concentration Target ('concentration target') - a maximum concentration of 10µg/m3 to be met across England by 2040 and Population Exposure Reduction Target ('exposure target') a 35% reduction in population exposure by 2040 (compared to a base year of 2018).

- **WHO Guidelines[58]:** Are a set of evidence-based recommendations of limit values for specific air pollutants developed to help countries achieve air quality that protects public health. The first release of the guidelines was in 1987. Since then, several updated versions have appeared and the latest global version was published in 2005.They are significantly lower than the current legal limit. Specifically annual average concentrations of PM2.5 should not exceed 5 µg/m3, while 24-hour average exposures should not exceed 15 µg/m^3 moralth e than 3 -4 days per year.

5.2   Baseline – sustainability context relevant to the NNNPS[59, 60]

Poor air quality is the greatest environmental risk to public health in the UK with between 28,000 and 36,000 deaths a year attributed to long-term exposure. It is known to exacerbate the impact of pre-existing health conditions, such as respiratory and cardio-vascular diseases (CVD), especially for the elderly and infants. UK Health Security Agency's (UKHSA), formerly Public Health England

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[55] Office for Health Improvement & Disparities (2016) Public Health Outcomes Framework. Available at: https://fingertips.phe.org.uk/profile/public-health-outcomes-framework [Accessed 25/02/2022].

[56] Ministry of Housing, Communities & Local Government (2021) National Planning Policy Framework. Available at: https://www.gov.uk/guidance/national-planning-policy-framework [Accessed 18/02/2022].

[57] Air Quality Targets in the Environment Act - Defra, UK

[58] What are the WHO Air quality guidelines?

[59] Public Health England (2018) Guidance: Health matters: air pollution. Available at: https://www.gov.uk/government/publications/health-matters-air-pollution/health-matters-air-pollution [Accessed 25/02/2022].

[60] Marshall, C. (2020). BBC News: Air pollution death ruling: What comes next? Available at: https://www.bbc.co.uk/news/science-environment-55352247 [Accessed 25/02/2022].

(PHE), modelling framework found that in 2017 there were 63,430 (±2,154) total incidence cases of disease attributable to PM2.5 in England.

Although air pollution can be harmful to everyone, people living in polluted areas, including those living close to congested roads, are exposed to higher levels of air pollution in their day-to-day lives and as such, are more likely to be affected. Older people, children, individuals with existing CVD or respiratory disease, pregnant women and low-income communities are more susceptible to health problems caused by air pollution, and consequently more likely to be more affected.

The case of nine-year-old Ella Adoo-Kissi-Debrah, who had lived near the South Circular Road in Lewisham and died in 2013, following an asthma attack, marked the first case where air pollution was recognised as a cause of a person's death.

5.2.1   National Statistics Release (1970 – 2020) [61], [62], [63]

- Road transport remains a significant source of particulate matter emissions (12% of PM10 and 13% of PM2.5 in 2020).
- Exhaust emissions decreased markedly since 1996 due to stricter emissions standards (by 90% for both PM10 and PM2.5).
- Non-exhaust road emissions from road traffic originate mainly from brake wear, tyre wear, road surface wear and re-suspended road dust in the wake of passing traffic. In the UK non-exhaust particles are the main source of primary PM (by mass) from road transport, for both the PM2.5 (60%) and PM10 (73%) size fractions and contributed 8.5% and 7.4% of total primary PM10 and PM2.5 emissions respectively in 2016. Considerable measurement evidence exists that non-exhaust PM sources result in significant increases in concentrations of PM and some metals at roadside locations. Even with a significant uptake in electric vehicles these non-exhaust sources are likely to remain an issue.
- In Europe non-exhaust PM emissions from transport are steadily increasing on par with increasing transport demand. In particular, sources of non-exhaust PM emissions from road transport from brake, tyre or road wear have all increased, and non-exhaust PM emission have overtaken exhaust emissions as the dominant emission source in transport.
- Road transport accounted for 28% of emissions of nitrogen oxides in the UK in 2020, and other forms of transport (aviation, rail, and shipping) accounted for 13%.

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[61] Department for Environment, Food & Rural Affairs (2020) National Statistics: Emissions of air pollutants in the UK – Particulate matter (PM10 and PM 2.5). Available at: https://www.gov.uk/government/statistics/emissions-of-air-pollutants/emissions-of-air-pollutants-in-the-uk-particulate-matter-pm10-and-pm25#trends-in-total-annual-emissions-of-pm10-and-pm25-in-the-uk-1970-to-2020 [Accessed 25/02/2022].

[62] AQEG - Air Quality Expert Group (2019) Non-Exhaust Emissions from Road Traffic. Available at: https://uk-air.defra.gov.uk/assets/documents/reports/cat09/1907101151_20190709_Non_Exhaust_Emissions_typeset_Final.pdf [Accessed 25/02/2022].

[63] ETC/ATNI (2021) Transport Non-exhaust PM-emissions: An Overview of emission estimates, relevance, trends and policies.

- In 2020 the UK was non-compliant with the limit value annual mean NO2 concentration at a small number of roadside locations in urban areas. A large reduction in road traffic activity in 2020 following the onset of the COVID-19 pandemic contributed to a substantial reduction compared to previous years. It has been estimated that on average 68% of roadside NOx concentrations originated from road transport emissions in 2020.
- Although ammonia can be emitted from vehicle exhausts as a by-product of the catalytic conversion process designed to reduce emissions of nitrogen oxides, road transport accounted for only 1% of total ammonia emissions in 2020 (compared to 4% in 2010). Between 2010 and 2020, ammonia emissions from road transport decreased by 65%.

5.2.2   Air Quality Management Areas (AQMAs) [64]

- In August 2021, 67.5% of all LAs (of 253 LAs) had one or more AQMAs (502 AQMAs for NO2, 28 AQMAs for PM10, 5 AQMAs for SO2).
- Most AQMAs are in urban areas and have been established to address the contribution to air pollution from traffic emissions of NOx or PM10, or in some cases both. A small number are for SO2.

5.2.3   Railway emissions [65, 66]

- Diesel train emissions comprise several harmful pollutants, including nitrogen oxides (NOx) and particulate matter (PM). PM is emitted from diesel engine exhausts, but also result from non-exhaust emissions such as brake and track wear. Further research is needed to understand the relative contribution of non-exhaust emissions from rail.
- Nationally, the railway contributes around 2% of total NOx and less than 1% of total PM.
- In some areas, diesel trains can contribute significantly to air pollution hotspots for various reasons. For example, at enclosed stations or in sidings, idling diesel trains lead to a build-up of pollutants.
- DfT is investing £4.5 million to establish a network of air quality monitors in stations across the country.
- Redirecting traffic and opening new stations out of town could reduce emissions and impact on biodiversity/protected sites. Green infrastructure could be used to address to mitigate PM exposure.

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[64] Department for Environment, Food & Rural Affairs (2020) Air Pollution in the UK Report. Available at: https://uk-air.defra.gov.uk/library/annualreport/index [Accessed 25/02/2022].

[65] Department for Transport (2021). Rail Environment Policy Statement On Track for a Cleaner, Greener Railway. Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1002166/rail-environment-policy-statement.pdf. [Accessed 02/03/2022].

[66] National Atmospheric Emissions Inventory (2018) UK NAEI. Available at: http://naei.beis.gov.uk/ [Accessed 02/03/2022].

5.3 Key sustainability issues potentially relevant to the NNNPS

- Although air quality is generally improving there are still issues related to air quality and national networks that need to be addressed. In addition, as awareness of pollution's health impact improves, the effects are being recognised as more severe.
- This includes addressing nitrogen dioxide (NO_2) concentrations. This is the only air pollutant for which the UK is currently failing to meet a statutory air quality limit value, with most exceedances occurring at roadside locations.
- There is inequality in exposure with poorer urban communities living close to the SRN particularly affected.
- Urban woodlands and trees, in particular street trees can assist with pollutant reduction in built up areas and within major transport corridors. Correct positioning and species choice of street trees is critical to avoid exacerbating vehicle and other anthropogenically generated pollution.
- Non-exhaust PM sources result in significant increases in concentrations of PM and some metals at roadside locations, specifically in urban environments, where roads are often characterised by greater braking per kilometre and higher traffic volumes. Given (a) there is little current legislation related to the composition of brakes and tyres, (b) standard test for brake wear emissions is still under development and (c) the net effect of battery-electric vehicle on non-exhaust PM sources are unclear, the future trajectory of non-exhaust PM is uncertain.[67]
- Rail generally contributes less to air quality issues but air pollution in and around train stations is an issue.

6. CLIMATE RESILIENCE, FLOODING AND EXTREME HEAT

6.1 Key policy and legislative drivers, objectives and targets relevant to the NNNPS

- **Climate Change Act (2008)**[68]**:** Established Committee on Climate Change (CCC) to advise on climate risks and mitigation. Requirement for climate change risk assessment (CCRA) and National Adaptation Programme (NAP) every five years.

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[67] It has been suggested that, because battery-electric vehicles (BEVs) are heavier than equivalent internal combustion engine vehicles, this may imply greater abrasion emissions and dust resuspension. However, regenerative braking reduces brake wear and vehicle weight is understood to have only a small influence on dust resuspension. Nonetheless, tyre and road wear are likely be weight dependent. Therefore, the net effect is uncertain. From: Committee on the Medical Effects of Air Pollutants (2020) Statement on the evidence for health effects associated with
exposure to non-exhaust particulate matter from road transport.
[68] UK Government (2008) Climate Change Act 2008. Available at:
https://www.legislation.gov.uk/ukpga/2008/27/contents [Accessed 18/02/2022].

- **UK CCRA3 (2022)** [69]**:** Based on third Independent Assessment of Climate Change Risk [70]. 61 UK-wide climate risks and opportunities. Eight priority areas for action, including transport networks.
- **UK NAP2 (2018-2023)** [71]**:** UK government's response to CCRA2, highlighting the economic and strategic value of the SRN and risks to severance and safety posed by climate change.
- **National Flood and Coastal Erosion Risk Management Strategy for England and Action Plan (2021)** [72, 73]**:** Measures to mitigate flood risk and build climate resilience into infrastructure.
- **National Planning Policy Framework** [74]**:** Role of planning policy in reducing vulnerability and providing resilience to impacts of climate change.
- **Flood and Coastal Erosion Risk Management: Policy Statement**[75]**:** This policy statement sets out the government's long-term ambition to create a nation more resilient to flood and coastal erosion risk.
- **Accounting for the Effects of Climate Change, Supplementary Green Book (2021)**[76]**:** States that is necessary to appraise using at least two climate scenarios. In practice, this means considering a parallel approach in appraisal; one baseline should be consistent with a '2°C' scenario and the other appraisal baseline should be consistent with a global temperature rise of 4°C, or '4°C' scenario.

6.2 Baseline – sustainability context relevant to the NNNPS

6.2.1 Climate Change in England[70, 72, 77]

- 21st century warmer overall than any of previous three centuries.

[69] Department for Environment, Food & Rural Affairs (2022) UK Climate Change Risk Assessment 2022 (Policy Paper) Presented to Parliament pursuant to Section 56 of the Climate Change Act 2008. Available at: https://www.gov.uk/government/publications/uk-climate-change-risk-assessment-2022 [Accessed 18/02/2022].

[70] Committee on Climate Change (2021) UK Climate Risk Independent Assessment (CCRA3): Technical Report. Available at: https://www.ukclimaterisk.org/ [Accessed 28/02/2022].

[71] Department for Environment, Food & Rural Affairs (2018) The National Adaptation Programme and the third strategy for climate adaptation reporting. Available at: https://www.gov.uk/government/publications/climate-change-second-national-adaptation-programme-2018-to-2023 [Accessed 28/02/2022].

[72] Environment Agency (2021) National Flood and Coastal Erosion Risk Management Strategy for England. Available at: https://www.gov.uk/government/publications/national-flood-and-coastal-erosion-risk-management-strategy-for-england--2 [Accessed 28/02/2022].

[73] Environment Agency (2021) National Flood and Coastal Erosion Risk Management Strategy for England Action Plan. Available at: https://www.gov.uk/government/publications/national-flood-and-coastal-erosion-risk-management-strategy-for-england-action-plan [Accessed 28/02/2022].

[74] Ministry of Housing, Communities & Local Government (2021) National Planning Policy Framework. Available at: https://www.gov.uk/guidance/national-planning-policy-framework [Accessed 18/02/2022].

[75] Department for Environment, Food & Rural Affairs (2020) Policy Paper Flood and coastal erosion risk management: policy statement. Available at: https://www.gov.uk/government/publications/flood-and-coastal-erosion-risk-management-policy-statement [Accessed 27/05/2022].

[76] Accounting_for_the_Effects_Of_Climate_Change_-_Supplementary_Green_Book_..._.pdf (publishing.service.gov.uk)

[77] Met Office (2018) UKCP18 Climate Change over Land. Available at: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-infographic-headline-findings-land.pdf [Accessed 28/02/2022].

- Average annual land temperature in 2010-2019 was 0.9°C warmer than in period of mid-1970s to mid-2010s.
- Small increase in annual mean rainfall by 4.5% between mid-1970s to mid-2010s period and 2010-2019.
- 5.2 million homes and businesses at risk from flooding.
- 9.2% increase in average sunshine hours from mid-1970s to mid-2010s period to 2010-2019. Spring 2020 sunniest on record across UK in series stretching back to 1929.
- Many of UK's record extreme monthly temperatures set in most recent decade, along with tendency for more heatwaves in London in recent years. In 1981-2000, probability of seeing a summer as hot as 2018 was low (<10%) but this has increased due to climate change and is now ~10-25%.
- Sea level has risen by 1.2-1.6mm per year since 1901. Coastal railway lines are at higher risk of floods and extreme weather conditions caused by sea levels rise. In general, rail is suffering more disruption from extreme weather than strategic roads.

6.2.2 Projected Trends in England[70, 78, 79]

- Annual temperatures expected to rise by ~1.3°C by 2050s and 1.4-2.4°C by 2080s, from 1981-2000 baseline. Risks from rising temperatures, e.g., more extreme heatwave events, likely to become more prevalent.
- Winter rainfall expected to increase by ~6% by 2050s and by 8%-13% by 2080s, from 1981-2000 baseline. Increased likelihood of flooding of infrastructure, businesses and homes.
- Summer rainfall expected to decrease by ~15% by 2050s and by 15%-22% by 2080s. Increased likelihood of drought and water scarcity.
- Frequency and intensity of extreme temperature and rainfall events likely to increase. In addition, by 2080 short duration rainfall events could increase by 15-55%, with greatest intensities in the NW and SW England.
- In the UK, summers that experience days above 40°C currently have a return time of 100-300 years but in a high climate change scenario this could increase to once every 3.5 years by 2100.
- Wetter winters and projected increase in intensity of rainfall by as much as 25%.
- Overall summer drying with wet days projected to become less frequent; more intense rainfall when it does rain.
- Sea level expected to rise by ~23-29cm by 2050s and by ~45-78cm by 2080s, compared to 1981-2000 baseline. Sea level rise could increase by 0.7-1.6m by 2100, with greatest increases in the south of England. Credible maximum 'H++'

[78] Environment Agency (2022) Guidance: Flood Risk assessments: climate change allowances. Available at https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances [Accessed 27/05/2022].
[79] Met Office Hadley Centre (2019): UKCP18 Convection-Permitting Model Projections for the UK at 2.2km resolution. NERC EDS Centre for Environmental Data Analysis. Available at: http://catalogue.ceda.ac.uk/uuid/ad2ac0ddd3f34210b0d6e19bfc335539 [Accessed 27/05/2022].

climate change scenarios indicate sea level rise of 2m is possible by 2100, although this is considered unlikely.

- Peak river flows could increase by 10% to 100+% by 2100, with significant variation across England depending on catchment type, although catchments in SW and NW England are among those with the greatest increases.

In terms of regional differences and risks to the national networks:

- By 2100, many northern regions could exceed 30°C at least once per decade. In the south-east, temperatures >35°C become increasingly common, and temperatures >40°C also become more likely.
- Rainfall intensity particularly likely to increase in the South East.
- Sea level rise expected to be greater in south of England than in other parts of UK.
- There are particular risks to national networks from climate change including safety risk and risk of disruption and damage as a result of: flooding; extreme rainfall events; heatwaves; wind gusts; and landslides. Up to 11% of road and 77% of rail infrastructure are at risk from flooding[72].
- Railway lines in some areas (mainly Cumbria and Devon) are at risk of severe floods as a result of climate change. The Dawlish railway line collapse in 2014 (where the railway line was partially destroyed by extreme weather conditions) represents what could happen to British coastal railways and the communities they serve in the coming decade. This case demonstrates the need for improved asset resilience in the rail network and the importance of identifying and mitigating climate risks.
- Poorly designed national networks can also increase risks (especially of flooding) adjacent to the network or have downstream effects.

6.3 Key sustainability issues potentially relevant to the NNNPS

- Resilience of national infrastructure to climate change and extreme weather events (such as hot weather, intense rainfall events, storm surges) is necessary for reasons of safety, reliance and reliability of the national networks. On this basis, it is important national infrastructure is designed using precautionary climate change allowances, considers the risks posed by credible maximum scenarios.
- This includes reducing risk of downstream effects and effects on communities adjacent to the network. The cumulative impacts of development and of climate change can be significant on the natural environment and communities. National networks can help through using nature-based solutions.
- NNNPS should align with second NAP and anticipated direction of third NAP due in 2023.
- Network Rail has been working on improving their adaptive capacity as well as increasing their understanding of the impacts of weather on their assets and nature and scale of the outstanding work. In the next 5 years of the third

Adaptation Reporting Power (ARP3), Network Rail will be delivering a plan of further strategic actions and asset improvements to ensure progress is made on the delivery of their Environmental Sustainability Strategy.[80]

- National Highways ARP3 reports on the results of a re-evaluation of significant climate risks threatening the safe operation of England's SRN, assesses progress against previously identified adaptation actions; and identifies areas for improvement and appropriate actions.[81]

- Linear networks often need to cross watercourses and their associated floodplains and defences, necessitating embankments, bridges and culverting. Such structures could potentially be at risk of flood risk, through the loss of floodplain storage, constrictions of flows or deflections of flood-flow routes. In addition, infrastructure in proximity to watercourses and floodplains, has the potential to prevent or hinder access to rivers and flood defences needed for maintenance and improvement purposes. It also has the potential prevent or hinder future flood risk management activity such as new, improved or set-back defences.

- The extensive sealing of surfaces has the potential to increase flood risk elsewhere by speeding run-off and preventing infiltration. Flood risk will need to be carefully considered in conjunction with pollution risk in the NNNPS.

- The NNNPS should explore delivering climate resilience alongside measure that deliver other outcomes. For instance, there could be the potential for a railway embankment to have a secondary purpose as a flood defence, if the circumstances dictate that this would be desirable and appropriate. This could help to reduce flood risk overall to existing communities. Similarly, waste spoil rom tunnelling could potentially be utilised in flood defences, where appropriate.

7. COMMUNITY IMPACTS AND ACCESSIBILITY

7.1 Key policy and legislative drivers, objectives and targets relevant to the NNNPS

- **Transport Investment Strategy (2017)**[82]**:** Recognises that connectivity of the transport system is a fundamental component of the positive economic contribution. Priority to add capability to the network (through new routes, better integration and links between communities and workplaces).
- **Future of Mobility: Urban Strategy (2019)**[83]**:** Government's approach to maximising urban mobility. Principles include targeting the reduction of congestion through more efficient use of limited road space, for example, through sharing rides, increasing occupancy or consolidating freight.

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[80] Network Rail (2021) Network Rail Third Adaptive Report.
[81] National Highways (2022) Preparing for climate change on the strategic road network – 3rd adaptation report under the Climate Change Act.
[82] Department for Transport (2017) Transport Investment Strategy. Available at: https://www.gov.uk/government/publications/transport-investment-strategy [Accessed 28/02/2022].
[83] Department for Transport (2019) Future of mobility: urban strategy. Available at: https://www.gov.uk/government/publications/future-of-mobility-urban-strategy [Accessed 28/02/2022].

- **Inclusive Transport Strategy (2020)** [84]**:** Achieving equal access for disabled people remains integral to the Department's aspiration of realising a fully accessible and inclusive transport system by 2030. The ambition is for disabled people to have the same access to transport as everyone else, and to be able to travel confidently, easily and without extra cost.
- **Rail Vehicle Accessibility (Non-Interoperable Rail System) Regulations (2010)** [85]**:** Sets out the accessibility standards to which new non-mainline (and older rail vehicles as and when they are refurbished) must comply.
- **National Disability Strategy (2021)** [86]**:** Outlines the actions the government will take to improve the everyday lives of all disabled people. This includes improving the accessibility and experience of everyday journeys, transforming the accessibility of the railway station network and improving accessibility of buses, bus stations and bus stops.
- **The Bus Services Act (2017)** [87]**:** Presents local authorities with new powers to bring about change and unlock the potential for the bus industry to achieve more for passengers.
- **England's long-term National Bus Strategy (2021)** [88]: Outlines ambitious reform of how bus services are planned and delivered.
- **Rural Transport Strategy (emerging)**[89]**:** Provides an overview of the main trends, benefits, challenges and uncertainties and outlines how technological and business innovation has the potential to transform how people and goods move around rural areas – both now and in the coming decades. impacts.
- **Cycling and walking investment strategy 2 (2021)** [90]**:** Outlines the Government's ambition to make cycling and walking a natural choice for shorter journeys, or as part of longer journeys by 2040.
- **Gear Change: a bold vision for cycling and walking (2020)** [91]**:** Outlines the Government's plan and vision to encourage cycling and walking, ensuring the necessary infrastructure and support are in place to facilitate the shift to active travel.
- **Environment Act (2021):** Two main functions:
  1. To give a legal framework for environmental governance in the UK.

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[84] Department for Transport (2020) Policy Paper: Inclusive Transport Strategy. Available at: https://www.gov.uk/government/publications/inclusive-transport-strategy [Accessed 28/02/2022].

[85] UK Government (2010) The Rail Vehicle Accessibility (Non-Interoperable Rail System) Regulations 2010, 2010 No.432. Available at: https://www.legislation.gov.uk/uksi/2010/432/contents/made [Accessed 28/02/2022].

[86] Cabinet Office (2021) Blog: The Disability Unit. Available at: https://disabilityunit.blog.gov.uk/2021/07/28/transport-national-disability-strategy-explained/ [Accessed 28/02/2022].

[87] UK Government (2017) The Bus Service Act 2017, 2017 c.21. Available at: https://www.legislation.gov.uk/ukpga/2017/21/contents/enacted [Accessed 28/02/2022].

[88] Department for Transport (2021) Policy paper: Bus back better. Available at: https://www.gov.uk/government/publications/bus-back-better [Accessed 28/02/2022].

[89] Department for Transport (2019) Future of Mobility Urban Strategy: Moving Britain Ahead. Available at Future of mobility: urban strategy (publishing.service.gov.uk)

[90] Department for Transport and Chris Heaton-Harris MP (2021). Cycling and walking investment strategy 2.

[91] Department for Transport (2020) Gear Change: a bold vision for cycling and walking - https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/904146/gear-change-a-bold-vision-for-cycling-and-walking.pdf - [Accessed 23/03/2022]

2. To bring in measures for improvement of the environment in relation to waste, resource efficiency, air quality, water, nature and biodiversity, and conservation. Subsection (5) has steps the government will take to improve people's enjoyment of the natural environment.

7.2   Baseline – sustainability context relevant to the NNNPS

7.2.1   Accessibility [92, 93]

There are access inequalities between urban and rural dwellers. For example:

- 97% of urban dwellers live within a 5-minute walk of a bus stop, but this compares to 75% in rural areas.
- 37% of urban dwellers have a train station less than 15-minutes' walk, but this compares to 2% in rural areas.
- Car dependency (and fuel consumption) is high in rural areas due to poor access to public transport. For people living in rural villages and hamlets, the average distance travelled per year is around 9,800 miles (of which 87% is by car) compared with an England average of 6,500 miles (of which 77% is by car). This means that rural communities are particularly exposed to fuel price rises.

There are also inequalities in journey times [93, 94, 95]:

- Average journey time (to reach nearest key services) in England was 19.6 minutes, with London at 11.8 minutes and the South West with the highest time of 24.9 minutes.
- People in rural areas experience longer journey times than those in urban areas:
  - In 2020, people living in the most rural areas travelled almost twice as far per year than those in the most urban areas.
  - The average minimum travel time to a hospital is a little over one hour in rural areas, compared with a little over half an hour in urban areas.

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[92] Department for Transport (2021) NTS0801: Time taken to walk to nearest bus stop by area type and bus availability indicator: England.

[93] Department for Environment, Food & Rural Affairs (2022) Delivering for rural England. Available at: https://www.gov.uk/government/publications/delivering-for-rural-england [Accessed 11/01/2023].

[94] Department for Transport (2019). Journey Time Statistics: Average minimum travel time to reach the nearest key services by mode of travel, local authority : England.

[95] Department for Environment, Food & Rural Affairs (2022) 2022 Statistical Digest of Rural England. Available at: https://www.gov.uk/government/statistics/2022-statistical-digest-of-rural-england-previous-updates [Accessed 13/01/2023].

In addition, [96, 97]

- One in five students consider dropping out of further education because of financial costs, of which transport is the greatest.
- One in three jobseekers report that inadequate transport is the biggest barrier to finding work.
- There is a direct correlation between improvement in bus services and reductions in social deprivation.
- Car ownership low amongst poorest in society, younger people and amongst some minority groups such as Black and LGBTQ*, who are more likely to live in urban areas.
- Access to rail stations is increasingly limited for those without cars, while many rail stations remain inaccessible to people with disabilities.

7.2.2 Health and active travel [98, 99, 100, 101]

- The adult population in England that walks or cycles for any purpose at least three times a week was nearly half (46%). The region with the highest proportion was the South West with 49.5% and the region with the least was West Midlands with 40.5%.
- Physical inactivity is associated with 1 in 6 deaths in the UK and is estimated to cost the UK £7.4 billion annually. The UK population is around 20% less active than in the 1960s. If current trends continue, it will be 35% less active by 2030.
- People living in more deprived areas are typically exposed to greater levels of motor vehicles on the streets in their neighbourhoods. This increases the risk of serious injury or death from a collision with a motor vehicle.
- Rural roads carry 43% of road traffic but account for 58% of road fatalities.

[96] Campaign for Better Transport (2011) Buses matter. Available at: https://bettertransport.org.uk/sites/default/files/research-files/11.02.23.buses-matter.pdf [Accessed 18/02/2022].

[97] ARUP and Greener Journeys (2018) Bus Infrastructure Investment. Available at: https://www.cpt-uk.org/media/jtbcu1fa/greener-journeys-arup-final-report-1.pdf [Accessed 18/02/2022].

[98] Department for Transport (2021) Proportion of adults who do any walking or cycling, for any purpose, by frequency and local authority: England.

[99] Office for Health Improvement and Disparities (2022). Wider impacts of Covid-19 on health monitoring tool. Available at: https://fingertips.phe.org.uk/profile/health-profiles/data [Accessed 18/02/2022].

[100] Office for Health Improvements & Disparities (2019) Guidance on Physical activity: applying All Our Health. Available at: https://www.gov.uk/government/publications/physical-activity-applying-all-our-health/physical-activity-applying-all-our-health [Accessed 18/02/2022].

[101] Department for Transport (2021) Road Casualty Statistics in Department for Environment, Food & Rural Affairs (2022) Delivering for rural England. Available at: https://www.gov.uk/government/publications/delivering-for-rural-england [Accessed 11/01/2023].

7.2.3   Vulnerable users [102, 103]

- On average, users with mobility difficulties made 0.5 rail trips per person per year compared with 13 rail trips per person per year for those without mobility difficulties in 2020. Those with mobility difficulties made 37% fewer car trips and 12% fewer bus trips in 2020 than those without mobility difficulties.
- Two thirds of disabled passengers reported experiencing at least one problem during their rail journey, including challenges in getting to a rail station, parking and vehicle access.

7.2.4   Community severance

Community severance refers to the separation of residents from facilities and services they use within their community caused by transport infrastructure. Community severance is a well-established phenomenon in transport planning. However, there are no national level data which demonstrates the extent of this issue (e.g., number of transport schemes that have caused severance issues, number of people impacted, km of road / rail network without crossing). However, it is known that national networks divide communities from each other and from key services in all parts of the country.

7.3   Key sustainability issues potentially relevant to the NNNPS

- The availability (frequency and network extent) of public transport varies between urban and rural areas and different regions in the country.
- The accessibility of transport networks differs for those with mobility difficulties and from lower economic profile, which in turn can limit access to key services, social interactions, and social mobility opportunities.
- Poorly designed transport interventions can generate negative impacts such as inequitable distribution of access to services, community severance, road accidents, noise, stress/anxiety, pollution and obesity.
- Green Infrastructure including trees and woodland, are vital components of encouraging active travel.
- Promotion of active transport and access to open spaces has a role to play in improving public health problems such as obesity, diabetes, mental health issues and heart diseases, which are all conditions linked to physical inactivity, and can

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[102] Department for Transport (2021) Rail Factsheet. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1049929/rail-factsheet-2021.pdf [Accessed 18/02/2022].

[103] Department for Transport (2019) Research on experiences of disabled rail passengers. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/814862/experiences-of-disabled-rail-passengers.pdf [Accessed 18/02/2022].

help to deliver commitments set out in the Prime Minister 'Gear Change' strategy.

8. HERITAGE

8.1 Key policy and legislative drivers, objectives and targets relevant to the NNNPS

- **The Heritage Statement (2017) [104]:** This heritage statement sets out how the government will support the heritage sector and help it to protect and care for our heritage and historic environment in the coming years, in order to maximise the economic and social impact of heritage and to ensure that everyone can enjoy and benefit from it.
- **Environmental Improvement Plan (Formerly 25 Year Environment Plan (2018)) [105]:** Goal to enhance beauty, heritage and engagement with the natural environment by conserving and enhancing heritage assets.
- **National Planning Policy Framework (2021) [106]:** The NPPF includes policy on the conservation of heritage assets not given protection through designation under heritage legislation.
- **Planning (Listed Buildings and Conservation Areas) Act (1990) [107]:** Sets out framework to designate and protect Grade I, II* and II Listed Buildings and Conservation Areas and their settings. Provides framework around which the Local Planning Authorities consenting regimes are based.
- **Ancient Monuments and Archaeological Areas Act (1979) [108]:** Sets out framework to designate and protect Scheduled Monuments (including the control of works to them). Section 61(12) defines sites that warrant protection due to their being of public interest as 'ancient monuments'.
- **The Historic Buildings and Ancient Monuments Act (1953) [109]:** Relates to the registration of parks and gardens and battlefields.
- **Principles of selection for listed buildings (2010)[110]:** Sets out the criteria and principles applied by Secretary of State to decide whether a building should be listed under terms of the Planning (Listed Buildings and Conservation Areas) Act 1990.

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[104] Department for Digital, Culture, Media & Sport (2017) Heritage Statement 2017. Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/664657/Heritage_Statement_2017__final_-_web_version_.pdf [Accessed 27/05/2022].

[105] Department for Environment, Food & Rural Affairs and The Rt Hon Michael Gove MP (2018) 25 Year Environment Plan. Available at: https://www.gov.uk/government/publications/25-year-environment-plan [Accessed 02/03/2022].

[106] Ministry of Housing, Communities & Local Government (2021) National Planning Policy Framework. Available at: https://www.gov.uk/guidance/national-planning-policy-framework [Accessed 18/02/2022].

[107] UK Government (1990). Planning (Listed Buildings and Conservation Areas) Act 1990, 1990 c9. Available at: https://www.legislation.gov.uk/ukpga/1990/9/contents [Accessed 18/02/2022].

[108] UK Government (1979) Ancient Monuments and Archaeological Areas Act 1979, 1979 c46. Available at: https://www.legislation.gov.uk/ukpga/1979/46 [Accessed 18/02/2022].

[109] UK Government (1953) The Historic Buildings and Ancient Monuments Act 1953, 1953 c49. Available at: https://www.legislation.gov.uk/ukpga/Eliz2/1-2/49/contents [Accessed 18/02/2022].

[110] Department for Digital, Culture, Media & Sport (2010) Principles of selection for listed buildings. Available at: https://www.gov.uk/government/publications/principles-of-selection-for-listing-buildings [Accessed 11/01/2022].

- **Scheduled monuments policy statement (2013)** [111]**:** Sets out policies to identify, protect, conserve and investigate nationally important ancient monuments, including Scheduled Monuments.

8.2 Baseline – sustainability context relevant to the NNNPS

The National Heritage List for England 2021 (NHLE) provides the official record of nationally designated heritage assets: [112, 113]

- Total number of entries has grown from 400,551 in 2020, to 400,866 as of 31 March 2021, with greatest increase in Listed Buildings (+261).
- There were 4,562 new designated assets since 2010, with smallest increase in Scheduled Monuments (1.0%).
- In England in 2021 there were 379,126 Listed Buildings; 19,923 Scheduled Monuments; 1,696 Parks and Gardens; 47 Battlefields; 20 World Heritage Sites; 9,903 Conservation Areas.
- There are 31 World Heritage sites in the UK, 18 of which are entirely or partly in England.
- In addition, many SSSIs (designated by Natural England) contain more than one geological heritage feature.

The Heritage at Risk (HAR) Register for England 2021 identifies the number sites most at risk of being lost as a result of neglect, decay or inappropriate development [114]:

- The number of entries on the HAR Register continued to decline in 2021, dropping to 4,983 from 5,097 in 2020.
- In 2021 the HAR Register included 2,068 Listed buildings; 2,315 Scheduled Monuments; 104 Parks and Gardens; 3 Battlefields; 491 Conservation Areas.
- Most Grade I and II* Listed Buildings entries on the HAR register: Midlands (195 out of 772), representing 6.7% of all Grade I and II* listed buildings in the region (2,898).
- 2,315 at-risk scheduled monuments on HAR register; of these, 46% (1,065) in the South West.

Regional distribution:

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[111] Department for Digital, Culture, Media & Sport (2013) Scheduled Monuments & nationally important but non-scheduled monuments. Available at: https://www.gov.uk/government/publications/scheduled-monuments-policy-statement [Accessed 11/01/2023].

[112] Historic England (2021) Heritage Indicators 2021. Available at: https://historicengland.org.uk/research/heritage-counts/indicator-data/ [Accessed 21/02/2022].

[113] Historic England (2022) World Heritage. Available at: https://historicengland.org.uk/advice/planning/international/world-heritage/ [Accessed 02/03/2022].

[114] Historic England (2021) Heritage at risk 2021 Registries. Available at: https://historicengland.org.uk/images-books/publications/har-2021-registers/ [Accessed 02/03/2022].

- In England, generally there are more designated heritage sites in the South and fewer in the North:
    - Most designated heritage sites (and also sites at risk): South West (97,581 sites, 1,410 sites at risk).
    - Second most designated heritage sites: South East (80,049 sites).
    - Fewest designated heritage sites (and also sites at risk): North East (13,881 sites, 259 sites at risk).
    - Second and third fewest designated heritage sites: London (19,599 sites) and North West (27,271 sites).
- Largest regional increase in Listed Buildings registered on the NHLE 2020-2021 was East of England (+56).

National Networks negatively affect heritage assets. The strategic road and rail networks pass through and intersect numerous heritage areas and assets. National Highways, for example, work to protect, enhance and minimise impact of the road network on such assets and have conserved and enhanced 14 sites of cultural and historical significance in the past five years. [115]

In England, Scotland and Wales, the Railway Heritage Trust identifies 1,650 railway buildings and structures listed in 2009; over 100 Ancient Monuments and numerous parts of railway estate fall within Conservation Areas [116]. Both Network Rail and National Highways sponsor activities to safeguard these assets.

8.3 Key sustainability issues potentially relevant to the NNNPS

- Where national networks intersect with heritage assets and areas, there is a need to ensure protection and enhancement of heritage. This includes not only sites but the settings of those sites.

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[115] National Highways (2020) Designated funds plan 2020-2025. Available at:
https://nationalhighways.co.uk/media/lh2ll0ao/designated-funds-plan-2020-2025.pdf [Accessed 02/03/2022].
[116] Railway Heritage Trust (n.d.) Introduction to the Railway heritage Trust. Available at:
http://railwayheritagetrust.co.uk/what-is-the-rht/ [Accessed 02/03/2022].

9. LANDSCAPE AND TOWNSCAPE

9.1 Key policy and legislative drivers, objectives and targets relevant to the NNNPS

- **The European Landscape Convention (ELC) (2000)** [117]**:** Promotes landscape planning, protection, and management policies. Key principles: a) landscape is a resource inclusive of townscape; b) the relationship between people and place; and c) all landscapes are important, irrespective of their location (i.e. natural, rural, urban, and peri-urban areas) or condition (i.e. outstanding or degraded).
- **National Parks and Access to the Countryside Act (1949)** [118]**:** Makes provision for National Parks and the establishment of a National Parks Commission (NPC), responsibility now lies with Natural England.
- **Countryside and Rights of Way Act (2000) (CROW Act)** [119]: This Act provides for better management of Areas of Outstanding Natural Beauty (AONB).
- **Environmental Improvement Plan (Formerly 25 Year Environment Plan (2018))** [120]: Conserve and enhance the natural beauty of our landscapes by reviewing National Parks and AONBs for the 21st century, including assessing whether more may be needed. While development is not prohibited in National Parks or AONBs, major development should take place only in exceptional circumstances.
- **National Planning Policy Framework (2021)** [121]: Ensures planning policies and decisions contribute to protecting or improving the natural and local environment by:
    - Protecting and enhancing valued landscapes.
    - Maintaining the character of the undeveloped coast, while improving public access.
    - Prioritising the conservation and enhancement of landscape and scenic beauty in National Parks, the Broads and AONBs.
    - Limiting the impact of light pollution on local amenity, intrinsically dark landscapes and nature conservation.
- **The Road to Good Design (2018)** [122]: Details National Highways' approach to good design and quality of roads, which includes good road design that

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[117] UK Government (2012) European Landscape Convention: The United Kingdom Instrument of Ratification. Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/236096/8413.pdf [Accessed 28/02/2022].

[118] UK Government (1949). National Parks and Access to the Countryside Act (1949), 1949 c97. Available at: https://www.legislation.gov.uk/ukpga/Geo6/12-13-14/97 [Accessed 28/02/2022].

[119] UK Government (2000). Countryside and Rights of Way Act 2000. Available at https://www.legislation.gov.uk/ukpga/2000/37/contents. [Accessed 28/02/2022].

[120] Department for Environment, Food & Rural Affairs and The Rt Hon Michael Gove MP (2018) 25 Year Environment Plan. Available at: https://www.gov.uk/government/publications/25-year-environment-plan [Accessed 02/03/2022].

[121] Ministry of Housing, Communities & Local Government (2021) National Planning Policy Framework. Available at: https://www.gov.uk/guidance/national-planning-policy-framework [Accessed 18/02/2022].

[122] Highways England (2018) The road to good design. Available at https://nationalhighways.co.uk/media/l4ihgawx/strategic-design-panel-the-road-to-good-design.pdf. [Accessed 02/03/2022].

demonstrates sensitivity to the landscape, heritage and local community and seeks to enhance the place while being true to structural necessities.

- **Our Principles of Good Design (2020)** [123]: Sets Network's Rail approach to ensure projects are considered within a wide context, the correct practice has been used and that relevant local groups have been consulted, to maximise the benefits of the project. Analysis of the existing sites and context are to be undertaken including the assessment of the heritage value of the asset and surrounding area.
- **Independent report Landscapes review: National Parks and AONBs (2019)** [124]: Review to consider the next steps for National Parks and AONBs in England. The report includes 27 wide-ranging proposals.
- **Natural England new programme for protected landscapes (2021)** [125]: Proposals for new protected areas across England, alongside an ambitious, landmark programme to examine how more areas could benefit from landscape improvements and deliver more for people and nature. Under these proposals, four areas will be considered for greater protections, with potential to deliver over 40% of the additional 4,000km^2 required to meet the Prime Minister's commitment to protect 30% of our land by 2030 for nature.
- **Policy paper Landscapes review (National Parks and AONBs): Government response (2022)** [126]: Government response to the above Landscapes Review. Implementing the response to some proposals would involve changes to primary legislation.
- **30 by 30 Target (2020)** [127]: In 2020 the Prime Minister committed to protect 30% of the UK's land by 2030. Existing National Parks, AONBs and other protected areas already comprise approximately 26% of land in England. An additional 4% – over 400,000 hectares, the size of the Lake District and South Downs national parks combined – will be protected to support the recovery of nature.
- **Townscape Character Assessment: Technical information Notes (2017 revised 2018)** [128]: Explains how the principles and general approach of landscape character assessment can be applied to townscape character assessment. A townscape character assessment presents a description of the townscape that is distinctive to that place. It can provide an understanding of

[123] Network Rail (2020) Our Principles of Good Design. Available at: https://www.networkrail.co.uk/wp-content/uploads/2021/06/NR_Our-Principles-of-Good-Design.pdf [Accessed 02/03/2022].

[124] Department for Environment, Food & Rural Affairs (2019) Independent Report: Landscapes Review: National Parks and AONBs. Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/833726/landscapes-review-final-report.pdf. [Accessed 02/03/2022].

[125] Natural England (2021) Press Release Natural England announces landmark new programme for protected landscapes. Available at https://www.gov.uk/government/news/natural-england-announces-landmark-new-programme-for-protected-landscapes. [Accessed 02/03/2022].

[126] Department for Environment, Food & Rural Affairs (2022) Policy paper Landscapes review (National Parks and AONBs): government response. Available at: https://www.gov.uk/government/publications/landscapes-review-national-parks-and-aonbs-government-response [Accessed 02/03/2022].

[127] UK Government (2020) Press release: PM commits to protect 30% of UK land in boost for biodiversity. Available at: https://www.gov.uk/government/news/pm-commits-to-protect-30-of-uk-land-in-boost-for-biodiversity [Accessed 02/03/2022].

[128] Landscape Institute (2018) Technical Information Note: Townscape Character Assessment.

how a place has evolved and developed over time to respond to natural, social and economic drivers, and how this is reflected in the layout of streets, the architecture of buildings and the materials used.

9.2 Baseline – sustainability context relevant to the NNNPS

9.2.1 National Parks and AONBs [129]

- In England, there are 10 National Parks covering 1.2 million hectares (equivalent to 9.3% of the land area).
- The total population of England's National Parks is 321,000 (0.6% of the England population).
- There are 34 AONBs in England. AONBs enjoy the same level of protection as National Parks and share the same prime statutory purpose; the conservation and enhancement of natural beauty.

9.2.2 Townscape and landscape character [128, 130, 131]

- England is divided into a series of National Character Areas, each with their own characteristics and then further sub-divided into a range of Landscape Character Areas.
- There is currently no specific standard guidance produced by national government or statutory agencies on the characterisation of townscapes within urban areas. The vast majority of UK residents now live in built-up areas (over 80% at the 2011 census) and so the character and quality of the urban environment has a major impact on quality of life and well-being across society.

9.3 Key sustainability issues potentially relevant to the NNNPS

- National networks affect protected landscapes such as National Parks and AONBs. This is the case even when outside of them, due to traffic noise, lighting, reducing tranquillity etc.
- All landscapes are important, and landscape and townscape quality should be protected outside of designated areas. Landscape, townscape and cultural heritage are closely related, and it is important that they are treated holistically.
- Good design is important in reducing the effects of the current national network and any future changes (and ensuring that infrastructure projects reflect

[129] National Parks (2020) Key Facts and Figures for all 15 UK National Parks. Available at: https://www.nationalparks.uk/app/uploads/2020/10/Key-Facts-and-Figures-for-the-15-UK-National-Parks.pdf [Accessed 02/03/2022].
[130] Blandford, C. (2006). Townscape Character Assessment of Colchester, Tiptree, West Mersea and Wivenhoe. Available at: https://cbccrmdata.blob.core.windows.net/noteattachment/Townscape%20Character%20Assessment%20Part%20One.pdf [Accessed 02/03/2022].
[131] ONS (2011) 2011 Census.

landscape and character context) but the mitigation hierarchy is important (avoidance, mitigation and ultimately compensate for impacts).
- The NNNPS should align with future aspirations for landscape and protected areas such as the 30 by 30 target.

10. NOISE AND VIBRATION

10.1 Key policy and legislative drivers, objectives and targets relevant to the NNNPS

- **Environmental Noise (England) Regulations (2006 SI 2238 as amended)**[132]: Regulations implementing the European Environmental Noise Directive (END) and apply to environmental noise, mainly from transport. Require regular noise mapping and action planning for road, rail and aviation noise and noise in large urban areas (agglomerations). Requirement to produce Noise Action Plans based on maps for road and rail noise and noise in agglomerations. Action Plans identify areas exposed to the highest noise levels (Important Areas, IAs) and suggest methods for mitigation.
- **Noise Action Plan: Agglomerations (Urban Areas) Environmental Noise (England) Regulations (2006, as amended July 2019)**[133]: Relevant to highway and rail authorities and local authorities in the agglomerations.
- **Noise Action Plan: Roads Environmental Noise (England) Regulations 2006 (July 2019)**[134]: Address the management of noise issues and effects from roads (including "Major Roads") in England.
- **Noise Action Plan: Railways Environmental Noise (England) Regulations 2006 (2019)**[135]**:** Address the management of noise issues and effects from railway sources.
- **National Planning Policy Framework (2021)**[136]: Recognises that potential adverse noise impacts resulting from new development should be minimised and mitigated, and noise giving rise to significant adverse impacts on health and quality of life should be avoided. Tranquil areas should be identified and protected.

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[132] UK Government (2006) The Environmental Noise (England) Regulations 2006. Available at: https://www.legislation.gov.uk/uksi/2006/2238/contents/made [Accessed 28/02/2022].

[133] Department for Environment, Food & Rural Affairs (2019) Noise Action Plan: Agglomerations (Urban Areas) Environmental Noise (England) Regulations 2006, as amended 2 July 2019. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/813663/noise-action-plan-2019-agglomerations.pdf [Accessed 14/03/2022].

[134] Department for Environment, Food & Rural Affairs (2019) Noise Action Plan: Roads Environmental Noise (England) Regulations 2006 2 July 2019. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/813666/noise-action-plan-2019-roads.pdf [Accessed 28/02/2022].

[135] Department for Environment, Food & Rural Affairs (2019). Noise Action Plan: Railways Environmental Noise (England) Regulations 2006 2 July 2019. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/813664/noise-action-plan-2019-railways.pdf [Accessed 28/02/2022].

[136] Ministry of Housing, Communities & Local Government (2021) National Planning Policy Framework. Available at: https://www.gov.uk/guidance/national-planning-policy-framework [Accessed 18/02/2022].

- **Noise Policy Statement for England (2010)** [137]: Aims to promote good health and quality of life through effective noise management within the context of Government policy on sustainable development.

10.2 Baseline – sustainability context relevant to the NNNPS

Roads in particular produce a substantial amount of noise. Excessive road traffic noise (53 dB Lden) can cause adverse health effects such as cardiovascular disease, effects on sleep, annoyance, cognitive impairment etc. For rail traffic, noise level above 54 dB Lden are associated adverse health effects. [138]

Noise not only has impacts in dwellings but also impacts on use of outdoor spaces, designated landscapes and visitor attractions.

Research has shown that above 30km/h there is no perceivable difference in noise between combustion engine cars and electric vehicles (EV). The increase in traffic expected on the SRN from cheaper EV driving means that a shift to EVs is difficult to predict but may increase noise.

10.3 Strategic Noise Mapping (Defra) and Noise Important Areas

- Defra completed the 3rd round of strategic noise mapping in 2017 and reported the results in 2019[139]. The4th round started in 2020, and will be available later in 2022). This covers 65 agglomerations in England (defined as an urban area with a population of >100,000 persons and a population density equal to or greater than 500 people per km^2).
- In the 3rd round:
  - IAs identified as where 1% of population affected by highest noise levels from major roads, railways and agglomerations are located. Relevant authorities responsible for examining IAs and forming a view about what measures, if any, might be taken to assist with the implementation of the Government's policy on noise.
  - 57,000 people identified as immediately associated with major roads IAs outside agglomeration – higher than the 51,000 people identified in Round 2 (2012) and corresponding to the identification of 380 new IAs.
  - 5,000 people identified as immediately associated with major railways IAs outside agglomerations – higher than the 4,000 people identified in Round 2 (2012) and corresponding to ~20 entirely new IAs.

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[137] Department for Environment, Food & Rural Affairs (2010) Noise Policy Statement for England (NPSE). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69533/pb13750-noise-policy.pdf [Accessed 28/02/2022].

[138] World Health Organisation (2018) Environmental Noise Guidelines for the European Region. Available at: https://www.euro.who.int/__data/assets/pdf_file/0008/383921/noise-guidelines-eng.pdf [Accessed 25/02/2022].

[139] Department for Environment, Food & Rural Affairs (2019) Strategic Noise Mapping. Available at: https://www.gov.uk/government/publications/strategic-noise-mapping-2019 [Accessed 25/02/2022].

- o 130,000 and 13,000 people identified as associated with road and rail IAs respectively- higher than the 119,000 and 11,000 people identified in Round 2 (2012) and corresponding to ~140 and 50 entirely new Important Areas.
- o 2,500 IAs identified along the strategic road network.
- o No specific regional differences were identified in England. Generally, where urban population is greater, there is more associated noise.

10.4 Key sustainability issues potentially relevant to the NNNPS

- Road and rail noise can have a significant effect on communities living adjacent to the network. Noise also has negative impacts on species and can affect tranquillity which can impact on protected landscapes or their settings.
- Electrification of the vehicle fleet may have a positive impact on vehicle noise. Electric vehicles have quieter propulsion systems, although contact with the road surface will always cause some level of noise that may need to be mitigated.

11. CRITICAL INFRASTRUCTURE AND SECURITY

11.1 Key policy and legislative drivers, objectives and targets relevant to the NNNPS

- **National Cyber Security Centre – Cyber Assessment Framework (2019)** [140]**:** Appropriate organisational structures, policies, and processes should be in place to understand, assess and systematically manage security risks to the network and information systems supporting essential functions.
- **Public Sector Summary of Sector Security and Resilience Plans (SSRP) (2018)** [141]**:** This document sets out the public summaries of the 2018-19 SSRPs. The Department for Transport's SSRP listed the following priority areas:
    - Security: Put in place effective and proportionate mitigation measures to protect the transport network.
    - Incident response: DfT has well-exercised internal response procedures.
    - Cyber incident: DfT identifies and mitigates cyber risks and vulnerabilities across all transport modes.
    - Climate change and severe weather: Several actions are ongoing as part of Network Rail and National Highway's third Adaptation Reporting Powers.
    - Industrial action: DfT is working to understand the risk and mitigate the impact on the public and wider industry.
    - Severe space weather: DfT is planning for the impacts of space weather on transport control, navigation and communication systems.
- **Global Britain in a Competitive Age: The Integrated Review of Security, Defence, Development and Foreign Policy (2021)** [142]: A guide for action for those responsible for aspects of national security and international policy across government, including the consideration of critical infrastructure.

11.2 Baseline – sustainability context relevant to the NNNPS

Centre for the Protection of National Infrastructure (CPNI) is the government authority for protective security advice to the UK national infrastructure. Their role is to protect national security by helping to reduce the vulnerability of the national infrastructure to terrorism and other threats. National infrastructure is defined by the CPNI as those facilities, systems, sites, information, people, networks and

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[140] NCSC (2019) Cyber Assessment Framework. Available at: https://www.ncsc.gov.uk/collection/caf [Accessed 01/03/2022].

[141] Cabinet Office (2018) Public Summary of Sector Security and Resilience Plans. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/786206/20190215_PublicSummaryOfSectorSecurityAndResiliencePlans2018.pdf [Accessed 28/02/2022].

[142] Cabinet Office (2021) Policy Paper: Global Britain in a Competitive Age: the Integrated Review of Security, Defence, Development and Foreign Policy. Available at: https://www.gov.uk/government/publications/global-britain-in-a-competitive-age-the-integrated-review-of-security-defence-development-and-foreign-policy [Accessed 28/02/2022].

processes, necessary for a country to function and upon which daily life depends. In the UK, transport is one of 13 national infrastructure sectors.

The UK government's official definition of critical national infrastructure is: Those critical elements of infrastructure, the loss or compromise of which could result in:

- Major detrimental impact on the availability, integrity or delivery of essential services – including those services whose integrity, if compromised, could result in significant loss of life or casualties – taking into account significant economic or social impacts; and/or
- Significant impact on national security, national defence, or the functioning of the state.

The Strategic Road Network and the Rail Network would be considered as critical national infrastructure.

11.3 Key sustainability issues potentially relevant to the NNNPS

Infrastructure should be designed and operated in such a way as to be resilient to risks that could result in:

- Major detrimental impact on the availability, integrity or delivery of essential services – including those services whose integrity, if compromised, could result in significant loss of life or casualties – taking into account significant economic or social impacts; and/or
- Significant impact on national security, national defence, or the functioning of the state.

12. MACRO-ECONOMIC IMPACTS

12.1 Key policy and legislative drivers, objectives and targets relevant to the NNNPS

- **HM Treasury report: Build back better, our plan for growth (2021)**[143]**:** Reflects new opportunities and challenges such as those posed by the COVID 19 pandemic and exit from the EU. Supports Government's wider objectives such as the transition to net zero and levelling-up across the UK. This plan states:
    - Investment in transport is required to underpin economic recovery and growth.
    - Well-developed transport networks are enablers for businesses to grow and expand, allowing them to extend supply chains, deepen labour and product markets, collaborate, innovate and attract inward investment.
- **National Infrastructure Strategy (2020)**[144]**:** Plans to transform UK infrastructure to level up the country, strengthen the Union and achieve net zero emissions by 2050. Commits the following transport investments:
    - £4.2 billion for intra-city transport settlements to support largest city regions.
    - Over £27 billion investment in strategic roads.
- **Transport Investment Strategy (2017)**[145]**:** Department for Transport's priorities and approach for future transport investment decisions. Also outlines plans for a new 'rebalancing' measure, which will judge how investment programmes contribute to a more balanced economy.
- **Road Investment Strategy 2 (2020-2025)**[146]**:** Road investment strategy April 2020 to March 2025 including strategic vision and investment plan.
- **Rail Network Enhancements Pipeline (2018)**[147]: which sets out Government's approach to funding improvements on the rail network.
- **Union Connectivity Review (2021):** Recommendations to improve connectivity across the UK in the long-term.
- **The Road to Growth: Our (National Highways) strategic economic growth plans (2017)**[148]**:** A plan for optimising the economic impact of the SRN.

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[143] HM Treasury (2021) MH Treasury report: Build back better, our plan for growth.
[144] HM Treasury (2020) Policy Paper: National Infrastructure Strategy. Available at: https://www.gov.uk/government/publications/national-infrastructure-strategy [Accessed 28/02/2022].
[145] Department for Transport (2017) Policy Paper: Transport investment strategy Available at: https://www.gov.uk/government/publications/transport-investment-strategy [Accessed 28/02/2022].
[146] Department for Transport and Highways England (2020) Policy Paper: Road Investment Strategy 2 (RIS2): 2020 to 2025 Available at: https://www.gov.uk/government/publications/road-investment-strategy-2-ris2-2020-to-2025 [Accessed 28/02/2022].
[147] Department for Transport (2018) Rail network enhancements pipeline: a new approach for rail enhancements [Accessed: 23.03.2022]
[148] Highways England (2017) The Road to Growth Our strategic economic growth plan. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/600275/m160503_the_road_to_growth_Our_strategic_economic_growth_plan.pdf [Accessed 28/02/2022].

- **National Infrastructure Assessment National Infrastructure Commission (2018);** Confirmed Road spending up to 2025 and called for a shift in spending after that date from strategic roads to city regional public transport.
- **The Williams-Shapps Plan for Rail (2021)** [149]: Proposes a 30-year strategy for the railway including five-year business plans to "provide clear, long-term plans for transforming the railways to strengthen collaboration, unlock efficiencies and incentivise innovation".
- **DfT Outcome Delivery Plan: 2021 to 2022 (2021)** [150]: Sets how the Government will continue to deliver DfT's priority outcomes around connectivity, user experience, climate change, air quality and decarbonisation.

12.2 Baseline – sustainability context relevant to the NNNPS

12.2.1 Gross Domestic Product [151], [152], [153], [154], [155], [156]

- Prior to the COVID 19 pandemic the UK economy had an average annual GDP growth of 2.1% between 2015 and 2019.
- London accounted for 26% of UK GDP in 2018, followed by the South East accounting for 17%. The lowest contribution from England came from the North East with 3% and the East Midlands with 7%.
- COVID-19 restrictions caused the largest fall in annual GDP in 300 years.
- The economy is recovering and reached pre-COVID levels in December 2021 where the economy grew by 0.9% taking it 0.7% above its February 2020 level.
- Following the large 9.2% fall in 2020 because of the initial impact of the COVID 19 pandemic and public health restrictions, GDP output saw an annual rise of 7.3% in 2021.

[149] Department for Transport (2021) Policy paper Great British Railways: Williams-Shapps plan for rail. Available at: https://www.gov.uk/government/publications/great-british-railways-williams-shapps-plan-for-rail [Accessed 28/02/2022].

[150] Department for Transport (2021) DfT Outcome Delivery Plan: 2021 to 2022. Available at: https://www.gov.uk/government/publications/department-for-transport-outcome-delivery-plan/dft-outcome-delivery-plan-2021-to-2022 [Accessed 28/02/2022].

[151] ONS (2020) GDP, UK regions and countries: April to June 2021. Available at: https://www.ons.gov.uk/economy/grossdomesticproductgdp/bulletins/gdpukregionsandcountries/latest [Accessed 28/02/2022].

[152] ONS (2022) Gross Domestic Product: Year on Year Growth CVM SA%. Available at: https://www.ons.gov.uk/economy/grossdomesticproductgdp/timeseries/ihyp/pn2 [Accessed 28/02/2022].

[153] ONS (2021) Regional gross domestic product (GDP) local authority reference tables 1998-2019. Available at: https://www.ons.gov.uk/economy/grossdomesticproductgdp/datasets/regionalgrossdomesticproductlocalauthorities [Accessed 28/02/2022].

[154] HM Treasury (2021) MH Treasury report: Build back better, our plan for growth.

[155] ONS (2021) Coronavirus and the impact on output in the UK economy: December 2020. Available at: https://www.ons.gov.uk/economy/grossdomesticproductgdp/articles/coronavirusandtheimpactonoutputintheukeconomy/december2020 [Accessed 28/02/2022].

[156] ONS (2022) GDP monthly estimate, UK: December 2021. Available at: https://www.ons.gov.uk/economy/grossdomesticproductgdp/bulletins/gdpmonthlyestimateuk/latest [Accessed 28/02/2022].

12.2.2 Productivity[154,][157]

- The UK has had a long-standing productivity gap to other major economies, due partly to historic low levels of investment in infrastructure.
- In the UK, there are large disparities both across and within nations and regions exist, with only London and the South East with productivity above the UK average (see the section on levelling up for further details).

12.2.3 Labour market [158,][159,][160]

- In the UK employment rate was at a record high of 76.6% and was outperforming most OECD countries until 2020 when rates fell, mostly impacted by Covid-19. While unemployment is still above levels prior to the COVID 19 pandemic (3.8%), in December 2021 it was below the average level in the five years before the beginning of the COVID 19 pandemic at 4.2%.
- Employment trends have not been felt equally with many elementary professions, younger workers and older workers experiencing the largest impacts.
- Recent labour market trends include record job vacancies and businesses struggling to fill posts.

[157] ONS (2018) Regional labour productivity, including industry by region, UK: 2018. Available at: https://www.ons.gov.uk/economy/economicoutputandproductivity/productivitymeasures/bulletins/regionallabour productivityincludingindustrybyregionuk/2018 [Accessed 28/02/2022].

[158] ONS (2021) Labour Force Survey - national and regional - headline indicators (seasonally adjusted).

[159] ONS (2021) Changing trends and recent shortages in the labour market, UK: 2016 to 2021. Available at: https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/articles/cha ngingtrendsandrecentshortagesinthelabourmarketuk/2016to2021 [Accessed 28/02/2022].

[160] ONS (2021) Business insights and impact on the UK economy November 2021. Available at: https://www.ons.gov.uk/businessindustryandtrade/business/businessservices/bulletins/businessinsightsandimp actontheukeconomy/4november2021 [Accessed 28/02/2022].

12.2.4 Strategic Road Network contribution to the economy [161], [162], [163], [164]

- Plays a critical role in national and local economic prosperity by connecting businesses and people and enabling employment and productivity growth.
- Although it accounts for only 2.4% of roads in England, the SRN carries a third of all road traffic and two thirds of freight traffic (2020).
- Almost three quarters of businesses regard tackling congestion on the road network as either critical or important to the future operation of their business.
- SRN-reliant sectors (e.g., land transport, retail and wholesale trade) contribute significantly to the economy, employing more than 7.4 million people and contributing over £314 billion in Gross Value Added (GVA) to England's economy.
- In 2020 Road freight contributed £13.6 billion to the UK economy and is the main method of transporting freight across the UK.
- The RIS1 economic analysis carried out by DfT identified that 56% of user benefits (£22.6bn in total) accrued directly to business and freight.
- 96% of the population of England are within one hour's drive of an SRN junction/ 97% (51.3 million people) of England's population live within 15km of the SRN.
- The Road Investment Strategy 2: 2020-2025 [165], highlights the importance of the SRN for long-distance traffic, especially freight. One-third of all motor vehicle miles are made on the SRN, and that rises to two-thirds for HGVs. Traffic flows on these roads average 57,500 vehicles per day compared to 2,800 on local roads. Even on major local roads, average traffic flow is a quarter of that on the SRN. These journeys represent significant value for the country, enabling efficient freight logistics and underpinning many people's choices of where to live and work.
- Networks with the highest total delays reflecting both high traffic volumes and congestions conditions were the M25 (numerous sections), M1 (Northampton, South Yorkshire), M3 (Surrey), M6 (Staffordshire and Cheshire), M62 (north and west of Manchester) and A1 (Gateshead).

[161] Highways England (National Highways) (2016) Socio-Economic analysis: future forecasts and the strategic road network. Available from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/600272/SEGP_-_Underpinning_report_-_Socio-economic_analysis_future_forecasts_and_the_SRN.pdf [Accessed 28/02/2022].

[162] Department for Transport (2021) Road Traffic Estimates Great Britain 2020. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1028165/road-traffic-estimates-in-great-britain-2020.pdf [Accessed 28/02/2022].

[163] Department for Transport (2021) Domestic Road Freight Statistics UK 2020. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1006792/domestic-road-freight-statistics-2020.pdf

[164] Foresight, Government Office of Science (2019) Understanding the UK Freight Transport: Future of Mobility: Evidence Review. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/777781/fom_understanding_freight_transport_system.pdf [Accessed 28/02/2022].

[165] Department for Transport (2020) Road Investment Strategy 2: 2020-2025. Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/951100/road-investment-strategy-2-2020-2025.pdf [Accessed 23/03/2022].

12.2.5 Rail contribution to the economy [166], [167]

- The rail freight industry makes an important contribution to the nation's economy. The Rail Delivery Group calculated that the sector secured over £1.7 billion of benefits for Britain in 2016.
- The UK railway sector supported £42.9 billion of economic production and was associated with 710,000 jobs and £14.1 billion in tax revenues in 2019, new research by Oxford Economics found.
- Before the COVID 19 pandemic, the railway industry was growing and supporting even more jobs and GVA than just a few years earlier. In 2016, every pound spent in rail generated £2.20 of spending in the wider economy, yet by 2019 this had risen to £2.50. Rail is not just an important sector in its own right, but is also crucial for UK plc more widely, its economy and connectivity.

12.2.6 Rail income and expenditure [168]

- In 2019-2020 the rail system in England had an earned income of £12bn, received £5.1bn of government funding and £17.4bn in expenditures.
- 54% of the expenditure was attributed to operating rail passenger services and 41% on operating rail network infrastructure.
- From the earned income, only 8% came from freight (£0.8bn and HS1 (£0.2bn)).
- Between 2015-16 and 2019-20, earned income increased by 3%; government funding increased by almost 100% and expenditure increased by 17%.

12.2.7 Road cost and revenue [169], [170]

- Vehicle excise duty and fuel duty raise around £35 billion a year, which comprises approximately 1.5% of UK GDP.
- The largest single long-term fiscal cost of successful decarbonisation is the loss of revenue from motoring taxes as the vehicle stock moves from petrol and diesel engine vehicles to battery powered electric vehicles (EVs), which pay no

[166] Rail Delivery Group (2016) Rail Freight Working for Britain. Available at: https://www.raildeliverygroup.com/files/Publications/2018-06_rail_freight_working_for_britain.pdf [Accessed 28/02/2022].

[167] Godden, D (2021) Oxford Economics: The Economic contribution of UK Rail. Available at: https://www.oxfordeconomics.com/recent-releases/The-economic-contribution-of-UK-rail [Accessed 28/02/2022].

[168] Department for Transport (2021). A financial Overview of the rail system in England. Available at: https://www.nao.org.uk/wp-content/uploads/2021/04/A-financial-overview-of-the-rail-system-in-England.pdf [Accessed 28/02/2022].

[169] Q97. The Treasury's recent net zero review document gives a figure of £37 billion in 2019–20, equivalent to 1.7% of GDP: HM Treasury, Net Zero Review Analysis exploring the key issues, 19 October 2021.

[170] House of Commons Transport Committee (2022) Road Pricing: Fourth Report of Session 2021–22. Available at: https://committees.parliament.uk/publications/8754/documents/88692/default/ [Accessed 28/02/2022].

- fuel duty or vehicle excise duty. This is particularly significant as the shift to fully electric vehicles now appears to be progressing more quickly than anticipated[171].
- Approximately 20% of that revenue (£7 bn) is disbursed on maintaining and developing roads through the National Roads Fund and strategic road upgrades.

12.2.8 Future growth [172, 173]

- Future growth is expected to concentrate around England's major cities including London, Birmingham, Bristol, Leeds, Liverpool, Manchester, Newcastle, Nottingham and Sheffield. However future growth is not limited to cities, other high value growth areas will be concentrated around London and the South East with strong growth spreading across the wider region radiating out from London.

12.3 Key sustainability issues potentially relevant to the NNNPS

- The road and rail network are important contributors to England's economic production, employment and future growth of places.
- Congestion and inefficiencies can pose a cost to the economy – in terms of lost working days, cost to freight and time.
- Productivity in England is falling behind in comparison to other major economies. Investment in infrastructure could stimulate productivity through reduced congestion, better connectivity and hence better allocation of resources; by enabling people to access employment opportunities that matches their capabilities and for business to effectively hire the most suited candidates.
- Improving the performance of the lowest performing regions could help the UK close the productivity gap between the UK and other countries, and close productivity gaps within the UK.

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[171] Office for Budget Responsibility: What does faster take-up of electric cars mean for tax receipts? https://obr.uk/box/what-does-faster-take-up-of-electric-cars-mean-for-tax-receipts/ [Accessed 13/10/2022].
[172] Highways England (2016) Socio-economic analysis, future forecasts and the strategic road network. Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/600272/SEGP_-_Underpinning_report_-_Socio-economic_analysis_future_forecasts_and_the_SRN.pdf [Accessed 28/02/2022].
[173] Economic forecasts (GVA and employment) as outputs from the Cambridge Econometrics local economic forecasting model.

13. LEVELLING-UP AND REGIONAL INEQUALITIES

13.1 Key policy and legislative drivers, objectives and targets relevant to the NNNPS

- **Levelling-Up the United Kingdom White paper (2022)**[174]: Sets out how the government will spread opportunity more equally across the UK. Investment in infrastructure is one of the factors that will help drive levelling up. Levelling up missions (objectives):
  - By 2030, local public transport connectivity across the country will be significantly closer to the standards of London, with improved services, simpler fares and integrated ticketing. This will be achieved by the following commitments:
    - £96bn Integrated Rail Plan, improving the rail network in the North and Midlands.
    - Invest £24bn in our busiest roads and motorways.
    - £5.7bn in City Region Sustainable Transport Settlements.
    - £5bn for buses, cycling and walking networks
  - By 2030 improve perceived well-being in all parts of the UK.
  - By 2030 narrow healthy life expectancy between the UK areas where it is highest and lowest, with the overall average healthy life expectancy rising by five years by 2035.

13.2 Baseline – sustainability context relevant to the NNNPS

13.2.1 Productivity[174, 93]

- In general, productivity tends to be higher in larger city-regions due to economies of scale and scope. This pattern is not entirely uniform. Even in high productivity cities, such as London, there are areas with low productivity. Haringey and Lewisham have productivity levels of 91% and 82% of the UK average respectively.
- In other large cities, such as Birmingham and Sheffield, productivity lies below the national average. Cities are not always highly productive, nor are towns and rural areas always underperforming. Some towns and rural areas are thriving in productivity terms. For example, Darlington has the same level of productivity as central Manchester.
- The productivity rate in predominantly rural authorities has not kept up with the rest of the country. In 2020 on average, it was 81% of the England average.

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[174] Department for Levelling Up, Housing and Communities (2022) Policy Paper: Levelling Up the United Kingdom. Available at: https://www.gov.uk/government/publications/levelling-up-the-united-kingdom [Accessed 28/02/2022].

13.2.2 Pay and education statistics 2021[175, 176, 93]

- Pay in the top region for earnings (London at £823 per week) is 1.5 times greater than the lowest region (the North East at £550 per week), the pattern is mirrored in education.
- The difference in the proportion of the adult population with a level 3 qualification or equivalent between these two regions is almost 16%.
- Median workplace-based earnings are lower in rural areas (£22,900) than in urban areas (£25,400).

13.2.3 Unemployment rate trend 2009-2020[177]

- Over the past 11 years, whilst the gap between the regions with the highest and lowest unemployment rate has been decreasing, the relative ranking across the regions in England has been largely unchanged; with the North East having the highest and South West and the South East having the lowest.

13.2.4 Journey Time Statistics 2019[178]

- Across regions in England the fastest mode to get to large employment centres (LSOAs with +5000 jobs) was the car, with minimal average journey time of 15.9 minutes, followed by the bike and public transport taking 29.9 and 31.2 minutes respectively.
- When travelling to large employment centres, only 11.9% of the population in the South West have access to public transport within a 15-minute reach. The highest percentage of the population with access to public transport when travelling to large employment centres within a 15-minute reach, is London with 23.5%.
- Across the regions, London had the shortest minimal travel time to large employment centres when travelling by all modes and the South West has the longest.

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[175] ONS (2021) Annual Survey of Hours and Earning: Earnings and hours worked, place of residence by local authority.

[176] ONS (2021) Annual Population Survey: All people aged 16-64 with Level 3+ skills, by local authority.

[177] ONS (2020) Annual Population Survey: Unemployment rate - aged 16-64.

[178] Department for Transport (2019) Journey Time Statistics: Average minimum travel time to reach the nearest key services by mode of travel, England, from 2014.

13.2.5 Indices for Levelling-up Fund [179]

- The Local Authorities that scored the highest in the levelling up index (with the combined indicators) were Hartlepool, Tendring, Wolverhampton, North East Lincolnshire and Thanet
- Local Authorities that scored the highest in the levelling up Indicator 2: Need for improved transport connectivity were Isles of Scilly, Scarborough, Hastings, East Lindsey and Rother.

13.3 Key sustainability issues relevant to the NNNPS

- Transport infrastructure is an important form of physical capital because it reduces "distances" between places and provides people, firms and workers with increased market access.
- Transport infrastructure has helped form regional inequalities, as transport infrastructure tends to bring increased economic benefits, meaning less well-connected places can get left behind.
- Given investment in transport will be a key pillar for delivering the levelling-up agenda, the NNNPS could contribute towards its delivery by prioritising transport and mobility investments in the local authorities with the greatest need of investments.
- Transport infrastructure has a role to play in connecting people with nature, facilitating active travel and improving access to greenspaces. It is important that inequalities in access are addressed.

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[179] Department for Levelling Up, Housing and Communities (2021). Spreadsheet model underpinning categorisation of places for the Levelling Up Fund. Available at: https://www.gov.uk/government/publications/levelling-up-fund-additional-documents [Accessed 28/02/2022].

14. CIRCULAR ECONOMY

14.1 Key policy and legislative drivers, objectives and targets relevant to the NNNPS

- **Circular Economy Package Policy Statement (2020)** [180]**:** Introduces a revised legislative framework, introduced through The Waste (Circular Economy) (Amendment) Regulations 2020, identifying steps for the reduction of waste and establishing an ambitious and credible long-term path for waste management and recycling.
- **Resource and Waste Strategy (2018)** [181]**:** Highlights the importance of effective sustainable resource management and outlines some of the systems and processes (such as adhering to circular economy principles and designing out waste) that can be implemented by the construction industry to support a more resource efficient approach (e.g., digitalisation, off-site manufacturing and new, innovative construction materials and techniques). Therefore the Strategy helps to promote the circularity and minimise the damage caused to the natural environment. This is supported through statute brought in under the Environment Act and also, through the Waste Prevention Programme for England (currently under review).
- **Waste Management Plan (2021)** [182]**:** Provides an overview of waste management in England, draws together all the relevant policies (i.e. 25 Year Plan, R&WS , NPPW, etc.) and establishes their relationships
- **Waste Regulations (2011) (as amended)** [183]**:** Outlines targets to achieve a minimum recovery rate of 70% (by weight) of non-hazardous construction and demolition waste by 2020.
- **Environment Act (2021):** Includes the long-term, legally binding target on waste reduction will take a holistic approach to reducing consumption of all materials, not just plastics or plastic packaging. This will reduce the overall volume of waste we generate, including plastic waste.

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[180] Department for Environment, Food & Rural Affairs (2020) Circular Economy Package Policy Statement. Available at: https://www.gov.uk/government/publications/circular-economy-package-policy-statement/circular-economy-package-policy-statement - [Accessed 02/03/2022].

[181] Department for Environment, Food & Rural Affairs (2018) Resource and Waste Strategy. Available at: https://www.gov.uk/government/publications/resources-and-waste-strategy-for-england [Accessed 02/03/2022].

[182] Department for Environment, Food & Rural Affairs (2021) Waste Management Plan. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/955897/waste-management-plan-for-england-2021.pdf [Accessed 02/03/2022].

[183] UK Government (2011) The Waste (England and Wales) Regulations 2011, 2011, No.988. Available at: https://www.legislation.gov.uk/uksi/2011/988/contents/made [Accessed 28/02/2022].

14.2 Baseline – sustainability context relevant to the NNNPS

14.2.1 Natural resource consumption [184]

- In 2018 England's material footprint (a measure of the global primary raw material extraction attributable to final domestic demand for goods and services) was around a third (34%) lower than in 2004.

14.2.2 Waste[182, 185]

- Construction, demolition and excavation (CD&E; including dredging) generated around three fifths (62%) of total UK waste in 2018.
- In 2018, the UK generated 67.8 million tonnes of non-hazardous C&D waste, of which 62.6 million tonnes was recovered. This represents a recovery rate of 92.3%. The recovery rate from non-hazardous C&D waste has remained at similar levels from 2010 to 2018.
- It is estimated that that 40% of microplastics in watercourses have originated from trye break and road wear[186].

14.3 Key sustainability issues potentially relevant to the NNNPS

- Good design is fundamental to encouraging a circular approach. In addition, co-creating measures, measures that encourage behaviour change, usage of digital technology and the elimination of hazardous components are all means for which the NNNPS can draw from to deliver greater sustainability outcomes.
- This applies throughout the process of designing, constructing and operating infrastructure assets: minimising the need for resources during the design process, specifying recycled material use wherever possible within the design and designing in such a way to allow for ease of maintenance and reuse, creating opportunities for re-use at end of life.
- Residual waste should be managed in a way that is as sustainable as possible, following the Waste Hierarchy and considering the connections and implications of applying a circular approach to delivering Net Zero.

[184] Department for Environment, Food & Rural Affairs (2021) Official Statistics England's Material Footprint. Available at: https://www.gov.uk/government/statistics/englands-material-footprint/englands-material-footprint [Accessed 02/03/2022].

[185] Department for Environment, Food & Rural Affairs (2021) UK Statistics on Waste July 2021 Update. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1002246/UK_stats_on_waste_statistical_notice_July2021_accessible_FINAL.pdf [Accessed 02/03/2022].

[186] Road dust-associated microplastics from vehicle traffics and weathering - ScienceDirect

15. SOIL, LAND, MINERALS AND AGRICULTURE

15.1 Key policy and legislative drivers, objectives and targets relevant to the NNNPS

- **Defra Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (2009)[187]:** A practical guide for anyone involved in the construction industry to protect the soil resources with which they work.
- **Agricultural Land Classification of England and Wales: Revised Guidelines for the Grading of Agricultural Land, MAFF (1988)** [188]: Criteria for grading the quality of agricultural land from excellent quality Grade 1 land to very poor quality Grade 5 land. Highest value is known as best and most versatile (BMV) agricultural quality (Grades 1, 2 and 3a).
- **Environmental Improvement Plan (Formerly 25 Year Environment Plan (2018))** [189]: Sets out the government's strategic direction for improving soil health so that it is appropriately managed to manage soils in a sustainable way and eliminate degradation threats by 2030, protect the best agricultural land, put a value on soils as part of our natural capital, and restore and protect peatland.
- **National Planning Policy Framework (2021)** [190]: Recognise soils as a natural capital asset that provide important ecosystem services, consider the economic and other benefits of BMV agricultural land, and try to use areas of poorer quality land instead of higher quality land. The NPPF emphasises that minerals are a finite natural resource. It outlines that mineral planning authorities are expected to safeguard mineral resources by creating Mineral Safeguarding Areas.
- **Planning Practice Guide for the Natural Environment (2019)**[191]: Explains key issues in implementing policy to protect and enhance the natural environment, including local requirements. References Defra's code of practice for the sustainable use of soil on construction sites, as guidance for protection of soil in construction projects, for when setting planning conditions for development sites.
- **Planning Practice Guide for Minerals (2014)**[192] :Provides guidance on the planning for mineral extraction in plan making and the application process. It also includes guidance on minerals safeguarding.

[187] Department for Environment, Food & Rural Affairs (2009) Code of practice for the sustainable use of soils on construction sites. Available at: https://www.gov.uk/government/publications/code-of-practice-for-the-sustainable-use-of-soils-on-construction-sites [Accessed 11/01/2023].

[188] MAFF (1988). Agricultural Land Classification of England and Wales. Available at http://publications.naturalengland.org.uk/publication/6257050620264448. [Accessed 02/03/2022].

[189] Department for Environment, Food & Rural Affairs and The Rt Hon Michael Gove MP (2018) 25 Year Environment Plan. Available at: https://www.gov.uk/government/publications/25-year-environment-plan [Accessed 02/03/2022].

[190] Ministry of Housing, Communities & Local Government (2021) National Planning Policy Framework. Available at: https://www.gov.uk/guidance/national-planning-policy-framework [Accessed 18/02/2022].

[191] Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government. Guidance: Natural Environment. Available at: https://www.gov.uk/guidance/natural-environment [Accessed 27/05/2022].

[192] Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government. Guidance: Minerals. Available at https://www.gov.uk/guidance/minerals [Accessed 27/05/2022].

- **Land contamination: technical guidance (2022)**[193] :Technical guidance on the management of contaminated land including how to investigate, assess and manage the risks.

15.2 Baseline – sustainability context relevant to the NNNPS

15.2.1 Soils and Land [194]

- Soils have degraded over the last 200 years due to intensive agricultural production (whereby cultivation has led to reduction of organic matter inputs and increases in soil losses), industrial pollution, soil sealing and disposal in landfill as a waste material.
- Soils in England continue to face threats such as soil erosion by wind and rain, compaction of soil reducing agricultural productivity and water infiltration. Soils are also at increased flood risk through higher levels of run off and organic matter decline. These threats will be exacerbated due to climate change.
- Soil holds 3 times as much carbon as the atmosphere and approximately 75% of the total terrestrial carbon. UK soils currently store about 10 billion tonnes of carbon, roughly equal to 80 years of current annual UK greenhouse gas emissions. However, degradation has led to most arable soils having already lost 40 to 60% of their organic carbon.
- Every year England and Wales loses 2.9 million tonnes of topsoil to erosion. Land use change is an important factor in soil erosion risk. In 2016, 58.7 million tonnes of soil was removed in urban areas, making up 26% of all waste generated in the UK.
- Soil erosion allows the release of stored carbon to the atmosphere, compaction limits infiltration and increased overland flow, which in turn increases flood risk.
- Over 22,000 hectares of the UK's land surface was changed from farmland, forests or wetlands to urban development in just 6 years up to 2012. The use of undeveloped land for building in England has more than tripled from an average of 4,500 hectares a year in the 2000s to an average of 15,800 hectares between 2013 and 2017. At current rates, over 1% of England's land will be converted to built development each decade.
- Around 11% of England is peatland. Peat soils are in serious decline, with only around 16% of the peat stock recorded in 1850 remaining. It is important to acknowledge the importance of peats in avoiding further carbon losses on degraded peat and enhancing carbon sequestration through peat restoration with regards to climate change mitigation and resilience.

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[193] Environment Agency (2022). Land contamination: technical guidance. Available at: https://www.gov.uk/government/collections/land-contamination-technical-guidance [Accessed 27/05/2022].

[194] The state of the environment: soil (EA, 2019). Available at The state of the environment soil (publishing.service.gov.uk). [Accessed 02/03/2022].

[195] Environment Agency (2016). Dealing with contaminated land in England. Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/513158/State_of_contaminated_land_report.pdf [Accessed 27/05/2022].

- From the latest progress report on dealing with contaminated land in England, there were 511 contaminated land determinations, whilst remediation at 430 sites have been fully completed.

15.2.2 Agriculture[196, 197]

- Agricultural land (mainly arable, horticultural and improved grassland) makes up 72% of the total UK land area (17 million ha) in 2017.
- Between 2000 and 2016 the estimated soil nutrient balance for nitrogen decreased by 18% and phosphorus decreased by 34%.
- There are five grades of agricultural land. The best and most versatile land is defined as Grades 1, 2 and 3a and these are finite.
- Around 3.9 million hectares of our soils are at risk of soil compaction. Actions to improve soil organic matter can be mutually beneficial for soil and production.

15.2.3 Minerals[198]

- Sales of primary aggregates peaked in 1989 but have since declined considerably, in 2017 primary aggregates sales for England were 133.3 million tonnes, comprising 79 million tonnes of crushed rock and 54.3 million tonnes of sand and gravel.
- In England and Wales, the principal source of crushed rock is limestone with marine sources accounting for 25% and 40% of total sales of sand and gravel, respectively. The UK has large resources of material suitable for use as aggregates.

15.3 Key sustainability issues potentially relevant to the NNNPS

- There is a need to rebuild the soil's carbon stores, prevent the generation of greenhouse gases from soil and increase the resilience to climate change.
- Soil carbon sequestration helps restore degraded soils, which can improve agricultural productivity.
- Carbon captured via soil carbon sequestration can be released if the soils are disturbed; national networks need to maintain appropriate soil management practices to support this.
- Healthy soils are also important for below ground biodiversity.

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[196] Department for Environment, Food & Rural Affairs (2017) Agriculture in the United Kingdom 2017. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/741062/AUK-2017-18sep18.pdf [Accessed 02/03/2022].

[197] Environment Agency (2019) The state of the Environment: soil. Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/805926/State_of_the_environment_soil_report.pdf [Accessed 27/05/2022].

[198] British Geological Survey (2019) Mineral Planning Factsheet – Construction Aggregates. Available at https://www2.bgs.ac.uk/mineraluk/download/planning_factsheets/mpf_aggregates.pdf [Accessed 02/03/2022].

- One of the vital ecosystem services provided by healthy soil is its ability to absorb and retain water, acting as a sponge to mitigate against flooding and drought. This ability is severely reduced by inappropriate soil management practices that cause degradation, e.g., through compaction, inappropriate soil mixing, loss of organic matter, and erosion.
- Development and operation of national networks should protect agricultural land, mineral reserves, and soils from degradation (including pollution from road and rail). Development should adopt sustainable use of soils.
- Other measures for the sustainable use of soils include reuse of soil, maximise on-site re-use of materials, promotion of circular economy and reducing the amount of waste disposal to landfill.
- In specific, national network will have to assess whether development is in the right places, avoiding best and most versatile land and embeds the 'environmental net gain' principle. This will enable a natural capital approach in spatial planning which will results in minimising the impact of development on finite land and soil resources.
- Consideration should also be given to restoring peat and avoiding further degraded peat, given their role in climate change mitigation and resilience.
- Minerals are a non-renewable resource.

16. WATER RESOURCES

16.1 Key policy and legislative drivers, objectives and targets relevant to the NNNPS

- **Environmental Improvement Plan (Formerly 25 Year Environment Plan (2018))**[199]: Includes policies and actions to deliver cleaner water in England's cities and rural landscapes. Contains a target to secure clean and plentiful water by 'improving at least three quarters of our waters to be close to their natural state as soon as is practicable'.
- **The Water Environment (Water Framework Directive) (England and Wales) Regulations (2017)**[200]: The Directive mandates that all European surface water must reach 'good ecological status' by 2015 with a maximum deadline of 2027. Water pollution remains a major impediment to achieving targets. Measures to address pollution in rivers, other surface water and groundwater in England will be crucial for the achievement of the Government's objectives for water quality in the Environmental Improvement Plan (formerly 25 Year Environment Plan).
- **The Groundwater (Water Framework Directive) (England) Direction (2016)**[201]: Provides guidance on how to protect groundwater and prevent groundwater pollution.
- **Nitrate Pollution Prevention Regulations (2015)**[202]: Designates land as nitrate vulnerable zones.
- **Environment Act (2021)**[203]: Requires a long-term target for the improvement of water to be set no later than 31 October 2022.
- **National Planning Policy Framework (2021)**[204]: Aims to prevent new and existing development from contributing to, or being put at unacceptable risk from, or being adversely affected by, unacceptable levels of water pollution.
- **River Basin Management Plans (2021)**[205]: There are 7 river basin districts in England, each with a RBMP managed by the Environment Agency. They include objectives related to nature, biodiversity, fisheries and water supply plus standards and actions needed for all waters. The Environment Agency is currently consulting on the updated next round of RBMP.

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[199] Department for Environment, Food & Rural Affairs and The Rt Hon Michael Gove MP (2018) 25 Year Environment Plan. Available at: https://www.gov.uk/government/publications/25-year-environment-plan [Accessed 02/03/2022].

[200] UK Government (2017) The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. Available at https://www.legislation.gov.uk/uksi/2017/407/contents/made. [Accessed 27/02/2022].

[201] UK Government (2016) The Groundwater (Water Framework Directive) (England) Direction 2016. Available at https://www.legislation.gov.uk/uksi/2015/1623/pdfs/uksiod_20151623_en.pdf [Accessed 25/02/2022].

[202] UK Government (2015) The Nitrate Pollution Prevention Regulations 2015. Available at https://www.legislation.gov.uk/uksi/2015/668/contents [Accessed 27/02/2022].

[203] UK Government (2021) Environment Act 2021, 2021 c30. Available at: https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted [Accessed 25/02/2022].

[204] Ministry of Housing, Communities & Local Government (2021) National Planning Policy Framework. Available at: https://www.gov.uk/guidance/national-planning-policy-framework [Accessed 18/02/2022].

[205] Environment Agency (2021) Policy paper Summary of the draft river basin management plans. Available at https://www.gov.uk/government/publications/summary-of-the-draft-river-basin-management-plans/summary-of-the-draft-river-basin-management-plans [Accessed 25/02/2022].

16.2 Baseline – sustainability context relevant to the NNNPS

16.2.1 Surface Waters [206, 207, 208, 209]

- In 2019 16% of all assessed surface waters (including rivers, lakes, estuaries and coastal waters) met good ecological status standard, which has remained largely unchanged since 2009. This remains well below the Environmental Improvement Plan's (formerly 25 Year Environment Plan) target of achieving 75% as soon as is practicable.
- One of the common pressures causing surface water bodies to fail the good ecological status standard is diffuse pollution from urban and transport, which affected 879 out of a total of 4950 (18%) of water bodies in 2019. This has risen from around 11% of waterbodies being affected by diffuse pollution from urban and transport in 2015.
- Road network pollutants come from tyre and brake wear, exhaust emissions, oil and fuel deposits. There are a substantial number of outfalls in England discharging run-off from roads and highways.
- 68,000 tonnes of microplastics are generated from brake and tyre wear from vehicles in the UK every year of which 7,000 to 19,000 tonnes enter surface waters. It is estimated that road run-off is the source for 66% of these pollutants in oceans.
- Potential sources of water pollution from rail include contaminated runoff from drainage systems, oil/ chemical storage areas, refuelling/ parking areas, general leaks from tanks/ pipework and contaminated wastewaters.
- In the future more frequent periods of dry weather in the UK will increase the incidence of rivers being in a critical low flow status affecting chemical and biological water quality. Climate change will also increase the intensity and frequency of rainfall which could measures to holdback surface water to prevent polluted surface water from entering waterbodies, may become ineffective.

[206] HM Government (2021) 25 Year Environment Plan Annual Progress Report April 2020 to March 2021. Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1032472/25yep-progress-report-2021.pdf [Accessed at 14/03/2022].

[207] Environment Agency (2021) Towns, cities and transport: challenges for the water environment. Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1027510/Towns-cities-transport-challenges-for-the-water-environment.odt [Accessed 14/03/2022].

[208] Boucher, J. and Friot D. (2017) Primary Microplastics in the Oceans: A Global Evaluation of Sources. Gland, Switzerland: IUCN, 2017.

[209] Met Office (2021) UK Climate Projections: Headline findings.

16.2.2 Groundwater [206, 210, 211, 212, 213]

- There are 271 groundwater bodies in England that are classified for quantitative and chemical status, based on quantity, quality and retention of water in aquifers. There has been a net increase in the number of groundwater bodies meeting good quantitative status, with 73% at good status in 2019 compared to 69% in 2015. There has been a net decrease in the number of groundwater bodies meeting good chemical status, with 45% at good in 2019 compared to 53% in 2015.
- Groundwater makes up around 30% of England's drinking water supply, with some areas of southern England up to 80%.

16.2.3 Coastal [214]

- Coastal water quality in England has improved in the last 20 years, however only 29% of estuaries and coastal water bodies in England were in high or good status in 2020.

16.2.4 Nitrates [215, 216]

- Around 55% of England is designated as a Nitrate Vulnerable Zone (NVZ) due primarily to elevated nitrate concentrations in groundwater and rivers, and to a lesser degree because of eutrophication of estuaries and lakes/reservoirs.
- Increased levels of nutrients (especially nitrogen and phosphorus) can speed up the growth of certain plants, disrupting natural processes and impacting wildlife. Catchments are now subject to nutrient neutrality requirements, where developers calculate exactly the amount of nutrient mitigation required, tailored to the specific needs of each catchment.

[210] Natural Environment Research Council. The Aquifers of the UK. Available at http://www.groundwateruk.org/downloads/the_aquifers_of_the_uk.pdf. [Accessed 14/03/2022].

[211] HM Government (2021). Policy paper River basin planning: progress report. Available at https://www.gov.uk/government/publications/river-basin-planning-progress-report/river-basin-planning-progress-report [Accessed at 14/03/2022].

[212] UK Groundwater Forum (n.d.) FAQs: Is the water in my tap groundwater? Available at http://www.groundwateruk.org/Is-The-Water-in-my-tap-groundwater.aspx [Accessed 14/03/2022].

[213] Environment Agency (2019) Manual for the production of Groundwater Source Protection Zones. Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/822402/Manual-for-the-production-of-Groundwater-Source-Protection-Zones.pdf [Accessed 14/03/2022].

[214] HM Government (2021) Trends in pressures on biodiversity: surface water status. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1025323/21_Surface_water_status.pdf [Accessed 15/03/2022]

[215] Environment Agency (2019) 2021 River Basin Management Plan – Nitrates. Available at https://consult.environment-agency.gov.uk/++preview++/environment-and-business/challenges-and-choices/user_uploads/nitrates-pressure-rbmp-2021.pdf [Accessed at 14/03/2022].

[216] Department for Environment, Food & Rural Affairs (2022) Policy Paper Nutrient pollution: reducing the impact on protected sites. Available at https://www.gov.uk/government/publications/nutrient-pollution-reducing-the-impact-on-protected-sites/nutrient-pollution-reducing-the-impact-on-protected-sites [Accessed at 27/05/2022].

16.2.5 River geomorphology[217]

- Almost 1500 discrete river systems, comprising over 200,000 km of watercourses may be identified across the UK
- With climate modellers predicting more flooding in the UK, the rates of river bed and bank erosion and floodplain sedimentation are also likely to accelerate.

16.3 Key sustainability issues potentially relevant to the NNNPS

- National Networks can be a source of pollution to water bodies. This can include microplastics and other pollutants in surface water run-off, but also the large volumes of surface water run-off overloading combined sewers and resulting in sewer overflow spills containing a mix of surface water and sewage. This is likely to become a bigger problem due to climate change. This is an issue for existing routes (as well as potentially for new routes) thus this issue should be addressed when upgrading routes as well as when building new ones.
- There is a need to consider how the SRN and rail lines could affect river geomorphology and vice versa. This is particularly important as with climate change, geomorphic activity rates are likely to accelerate leading to more flooding in the UK.
- Climate change could affect both the condition of waterbodies that road and rail infrastructure discharge surface water to, reducing their environmental capacity to accommodate polluted surface water.

[217] Macklin, G. and Harrison, S. (2012). Geomorphology and changing flood risk in the UK. Available at https://www.researchgate.net/publication/297667610_Geomorphology_and_Changing_Flood_Risk_in_the_UK [Accessed at 27/05/2022].

17. SAFETY

17.1 Key policy and legislative drivers, objectives and targets relevant to the NNNPS

- **The Road Safety Statement (2019)** [218]**:** Biannual statement outlining key actions for next two years.

- **The Rail Safety (Amendment etc.) (EU Exit) Regulations (2019)** [219]**:** Post-EU Exit amended version of The Railways and Other Guided Transport Systems (Safety) Regulations 2006 (ROGS), which put requirements of the 2004 European Railway Safety Directive into practice in Great Britain. ROGS provided a common framework for safety across other methods of guided transport (e.g., tramways) and updated the law on safety critical work.

- **The Railways (Interoperability)(Amendment)(EU Exit) Regulations (2019)** [220]: Post-EU Exit amended version of The Railways (Interoperability) Regulations 2011 (RIR 2011). This has a core requirement that no structural or vehicle subsystem can be put into use on or as part of the GB rail system unless the Office of Rail and Road (ORR) has provided an interoperability authorisation for the placing in service of that subsystem.

- **Highways Act (1980): Section 66 – Safety Provision** [221]**:** Outlines various provisions for public authorities to ensure the necessary provision of safety measures for publicly maintainable highways.

- **Construction (Design and Management) Regulations (2015)** [222]**:** Designers must consider the general principles of prevention and any pre-construction information to eliminate foreseeable risks to peoples' health or safety.

- **Great British Railways: Williams-Shapps plan for rail (2021)** [223]**:** Provides details on how the railways will change and details of the investment of the future of rail.

- **Cycling and Walking Strategy 1 (2017)** [224]**:** Outlines the government's ambition to make cycling and walking a natural choice for shorter journeys, or as part of longer journeys by 2040. Sets out the objectives and the aims and target that we will work towards in the shorter term.

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[218] Department for Transport (2019) The Road Safety Statement 2019: A Lifetime of Road Safety. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/817695/road-safety-statement-2019.pdf [Accessed 18/02/2022].

[219] UK Government (2019) The Rail Safety (Amendment etc.) (EU Exit) Regulations 2019. Available at: https://www.legislation.gov.uk/uksi/2019/837/contents [Accessed 15/03/2022].

[220] UK Government (2019) The Railways (Interoperability)(Amendment) (EU Exit) Regulations 2019. Available at: https://www.legislation.gov.uk/uksi/2019/345/contents [Accessed 15/03/2022].

[221] UK Government (1980) Highways Act. Available at: https://www.legislation.gov.uk/ukpga/1980/66/part/V/crossheading/safety-provisions [Accessed 01/03/2022].

[222] UK Government (2015) The Construction (Design and Management) Regulations 2015. Available at: https://www.legislation.gov.uk/uksi/2015/51/contents/made [Accessed 15/03/2022].

[223] Great British Railways: Williams-Shapps plan for rail - GOV.UK (www.gov.uk)

[224] Cycling and walking investment strategy - GOV.UK (www.gov.uk)

- **Cycle Infrastructure Design (LTN 1/20) (2020)[225]:** Provides guidance to local authorities on delivering high quality, cycle infrastructure.

17.2 Baseline – sustainability context relevant to the NNNPS

17.2.1 Road Safety Statistics[213, 226, 226, 227, 228, 93]

- In 2019 there were 2,060 people killed or seriously injured (KSI) on the SRN - a decrease of 54% from the 2005-2009 baseline of 3,017 deaths or serious injuries.
- 962 non-motorised and motorcyclist user casualties on the SRN in 2019 - 74 (7.1%) fewer than in 2018.
- The risk of being killed on an A road is as much as 15 times higher than being killed in cities such as London.
- Rural roads carry 43% of road traffic but account for 58% of road fatalities.
- The number of deaths on the SRN fell sharply between 2005-2012. Since 2012, the number of deaths on motorways has fluctuated without any further reductions achieved - in line with trends on all roads in Great Britain.
- At the end of 2020-21, accident frequency rate was 0.05 for staff in the Operations Directorate (higher than 0.02 at the end of Road Period 1) and 0.05 for National Highways' supply chain (an improvement on the score of 0.07 at the end of Road Period 1).
- Safety is a driving factor in people's transport choice and influences people's choices regarding sustainable modes such as walking and cycling. For example, only 28% of residents think cycling safety in their city is good and when asked why they do not cycle or why they cycle less often, 47% said they were concerned about safety.

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[225] Cycle Infrastructure Design (publishing.service.gov.uk)
[226] Office of Road and Rail (2021) Annual Assessment of National Highways' Performance. Available at: https://www.orr.gov.uk/sites/default/files/2021-11/annual-assessment-of-national-highways%E2%80%99-performance.pdf [Accessed 10/03/2022].
[227] Office of Road and Rail (2021) Benchmarking Highways England: 2020 Progress Report. Available at: https://www.orr.gov.uk/sites/default/files/2021-02/benchmarking-highways-england-2020-progress-report_0.pdf [Accessed 01/03/2022].
[228] Office of Road and Rail (2021) Annual Assessment of Highways England's Performance April 2020 to March 2021. Available at: https://www.orr.gov.uk/sites/default/files/2021-07/annual-assessment-of-highways-englands-performance-2021-web.pdf [Accessed 10/03/2022].

17.3 Rail Safety Statistics

17.3.1 Train and Station Safety [229], [230]

- The railway industry has a train accident risk reduction (TARR) metric. Performance was 96% for 2021/22, against a target of 90%, however this was subsequently reduced to 0% to recognise the impact of the Stonehaven derailment in Scotland and associated fatalities.
- There were a number of incidents at the platform-train interface in 2020/21 and two improvement notices: provision for wheelchair passengers and premature dispatching of trains.
- Estimated level of risk associated with signal passed at danger (SPAD) was 26% of the 2006 baseline figure in 2020/21– a particularly steep decrease of 76% since April 2020.
- 38 high potential train accident events recorded to date for 2021/22, which represents an increase since 2020/21.
- In 2019 (the last set of pre – COVID 19 pandemic figures), figures showed that Britain's railways were still the safest in Europe. [231]

17.3.2 Public and Workforce Safety [230]

- 20 public accident fatalities recorded to date for 2021/22 and a full year target of 26 set.
- 3 level crossing fatalities recorded to date for 2021/22.
- 190 suicides recorded to date for 2021/22. Suspected suicides have resulted in ~ 47,755 delay minutes this period and ~357,548 minutes for the financial year.
- Fatality weighted index (FWI) reduced to 0.073 in 2021/22 - five-year low but above the 0.056 year-end target.

17.3.3 Civil Engineering Assets [230]

- 2020/21 saw significant failures of a number of structures, including viaducts at Nine Elms and Carron Water.
- There has been an observed impact of more frequent severe weather events on management of ageing infrastructure, particularly earthworks and drainage systems.

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[229] Network Rail (2022) Safety, Health & Environment Performance (SHEP) Report 2021/22 Period 10 Report. Available at: https://safety.networkrail.co.uk/wp-content/uploads/2019/09/National-SHEP-202122-P10.pdf [Accessed 10/03/2022].

[230] Office of Road and Rail (2021) Annual Report of Health and Safety on Britain's Railways. Available at: https://www.orr.gov.uk/sites/default/files/2021-07/annual-health-and-safety-report-2020-21.pdf [Accessed 16/03/2022].

[231] The Rail Safety and Standards Board (2019): Annual Health and Safety Report 2018/2019.

17.3.4 Freight[232]

- Freight sector largely performing at a standardised level. At local level there are considerable variations, particularly around monitoring, audit and review. An example of poor health and safety risk control was freight train conveying petroleum products derailed at Llangennech in August 2020, where over 300,000 litres of fuel escaped, and several wagons caught fire.

17.4 Key sustainability issues relevant to the NNNPS

- Safety improvements on the SRN have stalled (in line with other road types) and A roads are under-performing compared to other road types.
- Safety continues to be a key focus area for Network Rail, with metrics indicating increased number of fatalities at level crossings and continued incidents at the platform-train interface. There is also room for improvement in ensuring the resilience of civil engineering assets.

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[232] Office of Road and Rail (2021) Annual Report of Health and Safety on Britain's Railways. Available at: https://www.orr.gov.uk/sites/default/files/2021-07/annual-health-and-safety-report-2020-21.pdf [Accessed 15/03/2022].

18. USER EXPERIENCE (INCLUDING COSTS OF TRAVEL)

18.1 Key policy and legislative drivers, objectives and targets relevant to the NNNPS

- **National Rail Conditions of Travel (2022)**[233]: Overview of binding contract between customers and the train companies that provide scheduled rail services on the National Rail Network when a ticket is purchased.
- **National Road Users Satisfaction Survey (2022)**[234]: Measures user satisfaction with journeys on motorways and major 'A' roads managed by Highways England. NRUSS result was a KPI for Highways England until March 2020.
- **National Rail Passenger Survey (2022)**[235]: Surveys > 50,000 passengers a year to generate network-wide picture of passengers' satisfaction with rail travel. Considers passengers' overall satisfaction and satisfaction with 30 specific aspects of the service. Paused in mid-2020 due to COVID-19 pandemic.
- **DfT Outcome Delivery Plan: 2021 to 2022 (2021)**[236]: Sets out how the Government will continue to deliver DfT's priority outcomes around connectivity, user experience, climate change, air quality and decarbonisation. Aims to build confidence in the transport network as the country recovers from COVID-19 and improve transport users' experience, ensuring a safe, reliable and inclusive network. Key User Experience metrics include % of: users satisfied with most recent journey, England (SRN); users very or fairly satisfied with provision in their local area, England (cycling, walking); rail journeys rated satisfactory, Great Britain; and trains running on time, Great Britain.
- **Section 28(2) of the Railways Act (1993)**[237]: Statutory basis for fares and ticketing regulation. Outlines obligations on franchising authority when it comes to such regulation.
- **Ticketing Settlement Agreement (1995)**[238]: Industry-wide agreement that describes how rail fares are created, set, honoured and settled between operators. Ensures nationwide ticketing exists as under British Rail. Requires all train operators to sell core range of tickets for all services.

[233] Network Rail (2022) National Rail Conditions of Travel. Available at:
https://www.nationalrail.co.uk/National%20Rail%20Conditions%20of%20Travel.pdf [Accessed 10/03/22].
[234] Transport Focus (2022) National Road Users Satisfaction Survey. Available at:
https://www.transportfocus.org.uk/insight/national-road-users-satisfaction-survey/ [Accessed 10/03/2022].
[235] Transport Focus (2022) National Rail Passenger Survey. Available at:
https://www.transportfocus.org.uk/insight/national-rail-passenger-survey/ [Accessed 10/03/2022].
[236] Department for Transport (2021) DfT Outcome Delivery Plan: 2021 to 2022. Available at:
https://www.gov.uk/government/publications/department-for-transport-outcome-delivery-plan/dft-outcome-delivery-plan-2021-to-2022 [Accessed 01/03/2022].
[237] UK Government (1993) Railways Act 1993. Available at: UK Government (2008) Climate Change Act 2008. Available at: https://www.legislation.gov.uk/ukpga/2008/27/contents [Accessed 18/02/2022].
[238] Rail Settlement Plan Ltd (1995) Ticketing and Settlement Agreement. Available at:
https://www.raildeliverygroup.com/our-services/rdg-accreditation/ticketing-settlement.html [Accessed 15/03/2022].

- **Fuel Excise Duty (2021)** [239]: Tax taken from all fuel sold in UK for motoring or heating - included in price for petrol, diesel and other fuels, alongside standard rate VAT, combined wholesale cost, distribution cost and retail margin.

18.2 Baseline – sustainability context relevant to the NNNPS

18.2.1 Road [236, 240, 240, 241, 242, 243, 244]

- On the Strategic Road Network (SRN), average delay was ~ 8.5 seconds per vehicle per mile compared to speed limit travel times for the year ending December 2021 – a 16.4% increase compared to year ending December 2020. Average delay in the last pre-pandemic year, 2019, was 9.5 seconds. Between 2017 and up until February 2020, the average delay on the SRN was increasing year on year, where average delay went from 8.9 seconds to 9.5 seconds.
- In 2019 89% of users were satisfied with their use of the SRN, this is a similar percentage reported in 2015.
- There was a 4-year high on fuel prices between March 2016 and March 2020. Prices fell after the COVID-19 lockdown was introduced and have since rebounded, surpassing pre-pandemic levels in June 2021 and currently (Feb 2022) witnessing record highs (petrol 148.02p per litre, diesel 151.57p per litre, on average). Between 2016 and February 2020, weekly road fuel prices have been volatile specially in response to geopolitical events, but generally they have been increasing.

[239] HM Revenue & Customs (2021) Guidance: Excise Duty – Hydrocarbon oil rates. Available at: https://www.gov.uk/government/publications/rates-and-allowances-excise-duty-hydrocarbon-oils/excise-duty-hydrocarbon-oils-rates [Accessed 15/03/2022].

[240] Department for Transport (2022) Travel time measures for the Strategic Road Network: January to December 2021 report. Available at:https://www.gov.uk/government/statistics/travel-time-measures-for-the-strategic-road-network-and-local-a-roads-january-to-december-2021/travel-time-measures-for-the-strategic-road-network-january-to-december-2021-report [Accessed 10/03/2022].

[241] Department for Business, Energy and Industrial Strategy (2022) National statistics: Weekly road fuel prices. Available at: https://www.gov.uk/government/statistics/weekly-road-fuel-prices [Accessed 10/03/2022].

[242] House of Commons Library (2022) Petrol and diesel prices. Available at: https://researchbriefings.files.parliament.uk/documents/SN04712/SN04712.pdf [Accessed 10/03/2022].

[243] Department for Transport (2021) Average delay on the Strategic Road Network in England: monthly and year ending from April 2015.

[244] Department for Transport (2015) Strategic Road Network Statistics January 2015.

18.2.2 Rail [236, 245, 245, 246, 247, 248, 249, 250]

- Passenger journeys on Britain's mainline railway network in 2020/21 declined to 400 million passenger journeys, just 22% of the 1.7 billion total passenger journeys seen in 2019-20.
- In 2020, a similar proportion (of ~45%) of passengers experienced a delay lasting between 15 and 29 minutes, and a delay lasting 30 minutes or more. The proportion of passengers experiencing a delay has increased 2% (~was 42%) from 2018.
- In Autumn 2019, the percentage of journeys rated nationally as satisfactory overall was 82%. This is a similar level as Autumn 2018 when 79% of journeys were satisfactory. The biggest impact on overall satisfaction was punctuality and reliability.
- Rail fares have risen by 46% over the past 10 years, while nominal weekly earnings have only grown by 23%. Therefore, rail fares have increased at twice the speed of wages since 2009.

18.3 Key sustainability issues potentially relevant to the NNNPS

- Prior to the pandemic, the average delay on the SRN was increasing year on year. This has sharply decreased from April 2020. Despite the reduction in rail passengers during the pandemic, the proportion of passengers experiencing delays between 2018 and 2020 has slightly increased.
- Trend of increasing costs to users of road (through fuel prices) and rail networks.
- User satisfaction with the SRN and rail services has remained relatively unchanged in recent years.

[245] ORR (2022) Freight Rail Usage and Performance. Available at: https://dataportal.orr.gov.uk/media/2049/freight-rail-usage-and-performance-2021-22-q3.pdf [Accessed 10/03/2022].

[246] Department for Transport (2020) Rail Delays and Compensation Summary Report. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/927876/rail-delays-and-compensation-report-2020.pdf [Accessed 10/03/2022].

[247] Trade Union Congress (2019) Rail fare have risen twice as fast as wages in past 10 years, finds TUC. Available at: https://www.tuc.org.uk/news/rail-fares-have-risen-twice-fast-wages-past-10-years-finds-tuc [Accessed 10/03/2022].

[248] Transport Focus (2019) Rail passenger satisfaction at lowest level for a decade. Available at: https://www.transportfocus.org.uk/news/rail-passenger-satisfaction-lowest-level-decade/ [Accessed 10/03/2022].

[249] ORR (2022) Passenger Rail Usage. Available at: https://dataportal.orr.gov.uk/statistics/usage/passenger-rail-usage/ [Accessed 10/03/2022].

[250] Transport Focus (2019) National Rail Passenger Survey: Main Report Autumn 2019.

19. AOS FRAMEWORK

19.1 Introduction

The information collected as part of the scoping process has been used to decide which sustainability criteria should be considered in the AoS and set the AoS framework which will be used for the assessment. The AoS framework is focused on those issues that the NNNPS can potentially most significantly affect (whether this is due to the nature of the environment or the nature of the plan itself).

19.2 AoS framework

The AoS framework defines "the scope and level of detail of the assessment" (which is the purpose of the AoS scoping report production and consultation) and is set out in Table 5-1 below. This table shows the AoS criteria and sub criteria that the NNNPS (and its reasonable alternatives) will be assessed against. These criteria are used rather than lengthy AoS objectives, decision making questions or targets. This approach ensures a consistent assessment which enables a clear comparison between sustainability topics and alternatives.

The assessment considers relevant objectives and targets (and the contribution of the NNNPS to their achievement) within the assessment. The evidence-based approach (see Section 5.3) outlines clearly how this information has been used as part of the assessment and this is built into the significance criteria.

The table also sets out the likely evolution of the baseline without the NNNPS by setting out the direction of current trends. This is a required step in AoS as it enables the NNNPS (and its reasonable alternatives) to be compared against this no plan scenario to enable plan makers to see the difference the plan would make compared to a situation where no plan was implemented. The assumption that has been made is that the current NNNPS would remain in place for decision making purposes.

Table 20-1 The AoS Framework

Criteria	Sub criteria. What is the likely effect (positive and negative) on…	Evolution of the baseline in the absence of the plan (do nothing)
GREENHOUSE GAS EMISSIONS		
Greenhouse gas emissions	• Construction emissions • Transport user emissions • Operational emissions • Carbon sinks[251]	In recent years, the UK has been significantly reducing its GHG emissions, but the transport sector remains one of the highest emitting sectors. The future baseline is dependent on how fast emissions can be decoupled from traffic growth. Although the cost of fuel is increasing, the overall cost of motoring has increased far less than public transport, and this trend would accelerate with electrification unless fuel duty is replaced.
NATURAL ENVIRONMENT		
Biodiversity and geodiversity	• Protected sites and species (including locally important) • Biodiversity Net Gain and nature-based solutions	Biodiversity has been in decline since the 1970s with the fastest decline in the last decade. The Environment Act will mandate biodiversity net gain and a statutory nature recovery target. The future baseline will be dependent on how effectively (and quickly) these

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[251] an element of the natural environment viewed in terms of its ability to absorb carbon dioxide from the atmosphere (tree planting or wetland creation for example)

Criteria	Sub criteria. What is the likely effect (positive and negative) on…	Evolution of the baseline in the absence of the plan (do nothing)
	• Strategic/landscape scale habitats / green infrastructure and connectivity • Direct and indirect (i.e., air quality) effects on habitats and species • Enforcement of the mitigation hierarchy • Long term enhancement and management especially for wider ecosystems services and nature recovery (in both rural and urban areas) • Climate change resilience of the natural environment. • Woodland and forestry (including ancient woodlands)	actions are implemented. However, protecting biodiversity is about more than biodiversity net gain.
NEIGHBOURING COMMUNITIES		
Air quality	• Emission levels • Air quality in communities living in close proximity to the road and rail	Poor air quality still poses the greatest environmental risk to public health and there are large inequalities in exposure (particularly related to the road network). Exhaust emissions have declined and will continue to decline with the electrification of the fleet. However,

Criteria	Sub criteria. What is the likely effect (positive and negative) on…	Evolution of the baseline in the absence of the plan (do nothing)
	network (particularly deprived communities) • Users of the network	there is uncertainty around possible future levels of non-exhaust emissions (which will not decline with the electrification of the fleet). They could remain high and increase in line with traffic demand.
Climate change resilience (including flooding)	• Climate change resilience of national networks • Climate change resilience of neighbouring communities	The UK is anticipated to experience hotter, drier summers; warmer, wetter winters; and rising sea levels. Current and new infrastructure will be under threat from these (and other) climate risks.
Community impacts and accessibility	• Access to NN by different groups (by income / deprivation, rural / urban plus vulnerable / disabled users) • Severance of communities • Health inequalities, access to public transport and active travel • Active travel and connectivity to greenspaces.	It is difficult to predict what is likely to happen in the future in relation to accessibility, health inequalities, active travel and severance. Without concerted action on a number of fronts barriers to accessibility will remain, particularly for certain groups.
Heritage	• Direct effects on heritage assets • Indirect effects on setting • Reducing Assets at Risk	Designated heritage assets benefit from protection that will continue without the NNNPS.
Landscape and townscape	• Protected landscapes (and their settings)	Designated landscapes benefit from protection that will continue without the NNNPS, and the Government has

Criteria	Sub criteria. What is the likely effect (positive and negative) on…	Evolution of the baseline in the absence of the plan (do nothing)
	• Landscape and townscape quality • Visual amenity (including effects of lighting) and tranquillity	ambitions to increase the proportion of the country that is protected.
Noise & vibration	• Noise and vibration from operation and use of the national networks • Noise and vibration from construction activities	The amount of people affected by transport (especially road) noise has increased in recent years. Electrification of the vehicle fleet may have a positive impact on vehicle noise. Electric vehicles have quieter propulsion systems, although contact with the road surface will always cause some level of noise that may need to be mitigated. Noise also has impacts upon wildlife.
ECONOMICS		
Critical infrastructure and security	• Resilience of the national networks to current and future threats	The world is facing a number of security threats ranging from climate change, international terrorism and action from hostile states. These threats are only going to increase (and evolve) in the future.
Macro-economic impact	• Contribution of national networks to macro-economic performance • Economic costs of delivering infrastructure • Congestion and reliability	Economic forecasts are uncertain as the country emerges from the COVID-19 pandemic. However, national networks will continue to play a critical role in national and local economic prosperity by connecting businesses and people and enabling employment and productivity growth.

Criteria	Sub criteria. What is the likely effect (positive and negative) on…	Evolution of the baseline in the absence of the plan (do nothing)
Levelling up (regional inequalities)	• Access to jobs and social infrastructure • Access to suppliers and markets • Social mobility	Access to opportunities could improve as the Government implements its levelling up agenda. Investment in transport will be a key pillar for delivering this.
RESOURCES		
Circular economy	• Use of natural resources (including for maintenance) • Waste generation and disposal/management	Good design should ensure that circular economy principles are embedded into design, construction and maintenance of national networks in the future.
Water resources	• Surface and groundwater quality • Water use	The negative impact of transport networks on water quality has been increasing.
Soil, land, minerals & agriculture	• Quality of agricultural land • Quality of quantity and health of topsoil • Development on brownfield and greenfield sites • Effects on mineral sites	Soils, minerals and land resources in England are likely to continue facing similar threats in the past (and these will be magnified by climate change).
TRANSPORT USERS		
User experience	• Journey time reliability • Journey times • User experience • Cost of travel	Prior to the pandemic, the average delay on the SRN was increasing year on year and this is likely to

Criteria	Sub criteria. What is the likely effect (positive and negative) on…	Evolution of the baseline in the absence of the plan (do nothing)
		continue and will have a negative effect on road user experience. There is a trend of increasing cost to users of road (through fuel prices) and rail networks, and this is likely to continue. However, although the cost of fuel is increasing, the overall cost of motoring has increased far less than public transport, and this trend would accelerate with electrification unless fuel duty is replaced. Cuts in funding for public transport are reducing services and leading to a modal shift towards driving, with this trend expected to accelerate if funding is further cut.
Safety	• Safety of NN users • Safety of members of public crossing NN/neighbouring communities • Safety of transport operatives	Trends in safety have fluctuated but remain consistent without any significant improvement in safety since 2012.

20. NEXT STAGES OF THE AOS

20.1 Introduction

The remaining stages of the AoS are as follows:

- Stage B Developing and refining alternatives and assessing impacts;
- Stage C Preparing the AoS Report;
- Stage D Consulting on the NNNPS and the AoS Report; and
- Stage E Monitoring the significant impacts of implementing the NNNPS (in accordance with established NNNPS processes).

This section of the scoping report sets out how Stage B will be completed:

20.2 Developing reasonable alternatives to the NNNPS

Stage B of the AoS process comprises the assessment of the NNNPS and reasonable alternatives. An AoS will be produced alongside the draft NNNPS for consultation.

20.3 Assessing impacts of the NNNPS and reasonable alternatives

The methodology of the AoS has been designed to be proportionate to the strategic non-spatial nature of the NNNPS. The assessment will be based on expert judgement, informed by evidence and discussion/validation with stakeholders. The assessment will be:

- Focused on identifying key potential significant effects of the NNNPS and reasonable alternatives to inform decision making; and
- Linked to an analysis of the evidence available using approaches which are clearly documented.

The stages of the assessment are:

1. Identification of the effects;
2. Assessment / scoring of effects; and
3. Mitigation and monitoring of significant effects.

These stages are described in more detail below.

20.3.1 Identification of the effects

This involves identifying changes to conditions in the baseline which are predicted to arise from the NNNPS. In the majority of cases a qualitative assessment will be made through use of expert judgement. This will be supported by documented evidence, where available, and assumptions made in undertaking the assessment will be clearly outlined. Evidence will be obtained from a variety of sources, such as DfT modelling data, research reports and scheme level appraisals. The quality of all evidence used will be assessed and levels of confidence in the data provided as part of assurance reporting processes.

20.3.2 Assessment / scoring of the effects

As part of the AoS, it is necessary to be clear about which of the effects are significant (whether this is significantly positive or negative). To do this in a clear and transparent way, a set of significance criteria has been defined for the assessment. The significance criteria that will be used are set out in Table 21-1. For each effect identified, a score will be given using the framework set out in Table 21-1. This will be undertaken using expert judgement after a review of the evidence available. All evidence / assumptions that have been used to make these judgements will be documented.

Table 21-1: SA scoring

Effect	Description	Score
Significant positive	Major positive effect on relevant receptors and fully supports the achievement of sustainability targets and objectives relevant to national networks. For example, the effect: • Substantially accelerates an improving trend. • Substantially decelerates a declining trend. • Substantially supports delivery of a declared objective or target.	++
Minor positive	Minor positive effect on relevant receptors and partly supports the achievement of sustainability targets and objectives relevant to national networks. For example, the effect: • Improves or accelerates an improving trend but in a marginal way. • Decelerates a declining trend but in a marginal way. • Supports delivery of a declared objective but in a marginal way.	+

Effect	Description	Score
Neutral	No change. Either no effects, or on balance (taking account of positive and negative impacts) a neutral contribution.	0
Uncertain	The potential for an effect is unclear. This may be due to: • Lack of clarity of how the policy will be applied / affect the baseline; or • Due to data gaps in the environmental / sustainability baseline (or both). Please note that uncertain effects will be treated as significant negative effects and mitigation identified.	?
Minor Negative effect	Minor negative effect on relevant receptors and could conflict with the achievement of sustainability targets and objectives relevant to national networks. For example, the effect: • Decelerates an improving trend, but in a marginal way. • Accelerates a declining trend, but in a marginal way.	-
Significant negative effect	Major negative effect on relevant receptors and actively works against the achievement of sustainability targets and objectives relevant to national networks. For example, the effect: • Substantially decelerates an improving trend. • Substantially accelerates a declining trend. • Substantially detracts from delivery of a declared objective or target.	- -

20.3.3 Mitigation and monitoring of significant effects

Where a significant negative effect has been identified, measures should be implemented to prevent, reduce or offset these effects. In addition, any uncertain effects should have mitigation suggested in order to reduce uncertainty and the potential for this to give rise to a significant negative effect. Where relevant, enhancement measures will be suggested to enhance the positive or neutral effects of policies.

Monitoring of potential significant and uncertain negative effects is also an important part of AoS and helps to identify unforeseen adverse effects at an early

stage thus, ensuring that appropriate remedial action is taken. Monitoring measures will be suggested for significant and uncertain effects.