Department for Energy Security & Net Zero

National Policy Statement for Energy – Update 2025

Appraisal of Sustainability – Main Report

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1. Introduction

This document is the Appraisal of Sustainability (AoS) report of the material changes made as part of the 2025 update to the National Policy Statements (NPS) for Energy, published by the Secretary of State for Energy Security and Net Zero (DESNZ) for consultation. In July 2024, the government launched a review of the energy NPSs to ensure they reflected government's energy priorities as set out in the Clean Power 2030 mission.

National Policy Statements (NPSs) are designated under the Planning Act 2008 to provide guidance for decision-makers on the application of government policy when determining development consent for major infrastructure. Their function is to state clearly how existing policy applies to development consent, removing discussion of the merits of government policy from the examination process so that decisions can be made on the basis of planning considerations alone. NPSs apply to infrastructure that is defined as a "Nationally Significant Infrastructure Project" (NSIP) in the Planning Act 2008.

The Energy NPS has been set out in the following series:

- EN-1: Overarching NPS
- EN-2: Natural Gas Electricity Generation
- EN-3: Renewable electricity generation (both onshore and offshore)
- EN-4: Gas supply infrastructure and gas and oil pipelines
- EN-5: The electricity transmission and distribution network
- EN-6: Nuclear generation

EN-1 to EN-5 were adopted in 2024 after undergoing a process of revision. The exception being nuclear generation (EN-6) which remains as designated by the Department of Energy and Climate in 2011. EN-6 only has effect in relation to nuclear electricity generation deployable by the end of 2025 but continues to provide information that may be important and relevant for projects which will deploy after 2025. A new NPS (EN-7) for new Nuclear generation is in the process of being developed in a separate process and once designated, will sit alongside the other elements of the Energy NPS.

EN-1 to EN-5 are currently being updated, reflecting changes in energy policy direction, with resulting material changes made to EN-1, EN-3 and EN-5. The material changes are set out in the consultation document 'Revised draft National Policy Statements for energy infrastructure' which was issued for consultation in April 2025. It is the purpose of this AoS to consider the implications that the updates may have had within the overall assessments of EN-1, EN-3 and EN-5 as undertaken for the 2024 adopted EN-1 to EN-5. The assessments of EN-2 and EN-4 have not been revisited.

An overview of the material changes to EN-1, EN-3 and EN-5, considered to have particular implications for the AoS, are as follows:

Clean Power 2030: In the Clean Power 2030 Action Plan, government committed to updating the NPSs for Energy in 2025 to reflect the needs of Clean Power 2030, improving policy certainty for developers and examining authorities. The policy narrative through EN-1 has been updated to bring Clean Power 2030 front and centre as the primary policy that the NPSs enable. It points towards the Clean Power 2030 Action Plan, which contains the capacity ranges for technologies in 2030 that the NPSs support. Successfully delivering Clean Power 2030 will require rapid deployment of new clean energy capacity. Delivering Clean Power 2030 also paves the way to decarbonising the wider economy by 2050, and focussing the narrative around the planning system on it will enable meeting those ranges by ensuring developers bring forward relevant projects.

Infrastructure projects relevant for Clean Power 2030 can be deemed Critical National Priority (CNP), with a presumption in favour of consent. This means that Energy from Waste projects will no longer benefit from CNP policy as they do not meet the definition of a clean power technology in the Clean Power 2030 Action Plan.

CNP policy was introduced in the previous 2024 amendments to the NPSs. The policy allows for the importance of low-carbon infrastructure to be considered during the decision-making process by the Secretary of State. The policy means that for qualifying infrastructure projects, where residual impacts remain after the mitigation hierarchy has been applied, it is unlikely that consent will be refused on the basis of these residual impacts.

The sustainability implications of Clean Power 2030 apply across all aspects of the NPS and as such are considered throughout the AoS.

Onshore Wind: Onshore wind is a mature, efficient and low-cost technology that plays an important role in the UK's energy mix. The mass deployment of onshore wind farms is critical in meeting the government's 2030 clean power pathway. The Clean Power 2030 Action Plan estimates the need for 27-29GW of operational onshore wind capacity by 2030.

It is considered vital that developers use the most efficient planning route to seek consent for their energy projects in order to make the UK a clean energy superpower. This is why, following consultation, government committed in December 2024 to reintroduce onshore wind into the NSIP regime at a threshold of 100MW.

Reintroducing onshore wind into the NSIP regime will ensure there is a level playing field with other generating technologies such as solar, offshore wind and nuclear. This will provide an appropriate route for large-scale projects seeking planning consent, where local impacts can be carefully balanced against the national benefits and meeting the UK's wider decarbonisation goals. To support the assessment and determination of onshore projects entering the NSIP regime, government has included a new section within EN-3 addressing the impacts, considerations and other matters specific to onshore wind.

The sustainability implications of onshore wind development are assessed in section 5 of this AoS Report (assessment of EN-1), particularly in respect of Objective 6 'Protect and enhance the character and quality of landscape, townscape and waterscapes and protect and enhance

visual amenity'. Consideration is also made in Section 6 (in respect of EN-3) and section 7 (in respect of EN-5).

Offshore wind: As part of the pre-application phase for a proposed offshore wind farm, it is proposed in EN-3 that an assessment of inter-array wake effects is recommended to take place between applicants and those of consented and operational wind farms in the pre-application stage to inform and support the consideration of potential mitigations.

It is also proposed that developers should make reasonable efforts to demonstrate that they have worked to manage the impact of wake effects on other occupiers and set out non-exhaustive examples of what this could include.

It makes clear that potential approaches include explaining how the project configuration has been evolved during the design process to reduce the impact or avoid the most impactful configurations, or manage the planned layout of an offshore wind turbine array to select layouts with reduced long-distance wake impact on other occupiers.

The aim of these inclusions is to provide greater clarity on how applicants can consider and potentially mitigate the impact of inter-array wake effects between new developments and nearby consented and operational wind farms, and how they could demonstrate their efforts to manage those effects, while still allowing for a variety of approaches depending on individual circumstances.

The sustainability implications of offshore wind development are assessed in section 5 of this AoS Report (assessment of EN-1), particularly in respect of Objective 6 'Protect and enhance the character and quality of landscape, townscape and waterscapes and protect and enhance visual amenity'. Consideration is also made in Section 6 (in respect of EN-3) and section 7 (in respect of EN-5).

Electricity Networks Infrastructure: Great Britain's electricity network needs a once in a generation expansion to deliver new homegrown, clean energy to homes and businesses up and down the country. The proposed changes will support this new infrastructure to be built faster, whilst maintaining a rigorous process to minimise costs and impacts.

Specific consideration of electricity networks infrastructure is made in section 7 of this AoS Report (in respect of EN-5), though consideration is also made as appropriate in respect of EN-1 and EN-3.

Endorsement of the Centralised Strategic Network Plan

Taking a holistic approach to planning transmission infrastructure is crucial to meet the rise in demand for low carbon electricity to achieve energy security and the national net zero goal. Building on the work of the "Pathway to 2030" Holistic Network Design for offshore wind and "Beyond 2030" reports, the Centralised Strategic Network Plan (CSNP) will help reduce the overall impact of infrastructure by taking a coordinated view of both the onshore and offshore network. The CSNP will provide an independent, long-term approach out to 2050 on how the transmission network should develop to meet energy security and decarbonisation goals. It will

be delivered by the National Energy System Operator (NESO) and regulated by Ofgem. The first CSNP will be delivered in 2027. Network plans will take account of environmental and community impacts, alongside deliverability, operability and economic cost, from the outset.

The CSNP process will provide a robust assessment of the possible options. Endorsement through the NPS would mean that the need case and technology type for projects that adhere to the recommendations of the CSNP do not have to be examined in the consenting process. The CSNP would establish the need case and technological solution; removing this from the consenting process could accelerate the pre-consenting stage and reduce project level risk.

Endorsement will include:

- The need case of reinforcements
- The strategic parameters of reinforcements: onshore/offshore, high voltage direct current (HVDC) or high voltage alternate current (HVAC), the spatial envelope – a defined area where options will be assessed, and how it connects to the Main Interconnected Transmission System.

Endorsement will not include:

- Indicative routing between recommended infrastructure: routing decisions will be confirmed during the Detailed Network Design process in accordance with appropriate surveys and consultation. As such, routes are subject to change and should not be considered fixed for planning purposes.

Specific consideration of CSNP is made in section 7 of this AoS Report (in respect of EN-5).

Energy from Waste (EfW): In the context of the NPS, EfW plants include conventional waste to energy facilities (i.e. electricity and heat generation) and Advanced Thermal Treatment and Advanced Conversion Technologies that process residual wastes to create a syngas or liquid fuel. Their primary purpose is to reduce the amount of residual waste going to landfill in accordance with the waste hierarchy, with the recovery of energy from that waste as electricity, heat, or fuel considered to be a secondary benefit that should be maximised as far as possible.

As the primary function of EfW plants, or similar processes, is to treat waste, it is the intention that such plants:

- Meet a clearly defined need to facilitate the diversion of non-recyclable waste away from landfill, or enable the replacement of older, less efficient waste incinerators;
- Can be built Carbon Capture ready, in accordance with the government's 'Decarbonisation Readiness' requirements once they come into force; and
- Demonstrate that making use of the heat they produce is viable and they can connect to a heat network within three years of the plant's operation.

It is worth noting that EfW plants will also be included in efforts to incentivise the deployment of carbon capture technology through the Industrial Carbon Capture Business Model for industrial users who often have no viable alternatives available to achieve deep decarbonisation.

It is also important to note that Critical National Priority policy does not apply to applications for EfW projects and the Welsh Government has put in place a moratorium on all new EfW plants greater than 10MW generation capacity in Wales.

Note that while the review is undertaken, the current suite of energy NPS remain relevant government policy and EN-1 to EN-6 have effect for the purposes of the Planning Act 2008.

In addition, this AoS has also allowed for consideration of a revised AoS Framework, developed as part of the periodic review process, that was consulted upon February to March 2025 (AoS Scoping consultation) and which has been applied to the updated assessments of EN-1, EN-3 and EN-5. The revised framework is set out within Section 2 and reflects changes in policy direction and/or new policy introduced since the last scoping exercise was undertaken and updates to understanding of baseline conditions and any new sustainability issues. Of pertinence to the assessment is the government's energy priorities as set out in the Clean Power 2030 mission.

Note, that whilst no revisions to EN-2 and EN-4 were made as part of the review and update process, it was also considered that the changes to the AoS framework did not merit reopening the assessments for the particular technologies set out with EN-2 and EN-4, and as such the reader should refer to National Policy Statement for energy – Appraisal of Sustainability (January 2024)[1] for full assessment details.

The main function of this report is to set out the likely significant effects on the environment of developing new energy infrastructure of the types envisaged by the updated energy NPSs as a whole and for each technology NPS being updated, as well as indicating how the NPSs are consistent with the principles of sustainable development more generally.

The approach adopted in the updated AoS is consistent with the requirements of SEA and has been expanded to include a wider range of issues, such as socio-economic issues, normally found within an AoS. This updated AoS focuses on the overarching NPS (EN-1) and then examines the technology specific NPS, with a focus on the alternatives and issues which are additional to those already covered in the assessment of EN-1. It is important to note that none of EN-1 to EN-5 are site specific and only provide a framework for assessing applications for developments of the relevant type in any location.

This updated AoS Report should be read in conjunction with the relevant National Policy Statements, in particular the updated Overarching NPS for Energy (EN-1) which sets out the background on the planning regime and government policy on energy and energy infrastructure. Updated AoS-1 in Section 5 must also be read in conjunction with the updated AoSs for the relevant technology-specific NPSs (AoS-3 and AoS-5) which are set out in Sections 6 and 7 of this report, and vice versa.

An update to the Habitats Regulations Assessment (HRA) was undertaken in parallel to the AoS and its results incorporated into the AoS as appropriate, though the updated HRA is

[1] National Policy Statements for energy infrastructure - GOV.UK

reported separately to this updated AoS report, in order to meet the requirements of the Habitats Regulations.

Purpose of this AoS Report

As noted above, this updated AoS report considers the material changes to EN-1, EN-3 and EN-5 as a result of the periodic review of the Energy NPS by DESNZ. AoS has two primary functions:

- The Environmental Assessment of Plans and Programmes Regulations 2004 (as amended), known as the Strategic Environmental Assessment (SEA) Regulations, require that before a plan or programme which establishes the framework for development consent is adopted, it should be subject to consultation alongside an environmental report which identifies, describes and evaluates the significant effects which its implementation is likely to have on the environment. Amongst other things, the NPSs are a plan or programme for the purposes of the Regulations, and so this AoS report fulfils the function of an environmental report under the Regulations.
- The Planning Act 2008 requires that NPSs must be the subject of an AoS before they are designated. The scope of such an appraisal is similar to that of an environmental report under the SEA Regulations, but with more emphasis on social and economic impacts, and informed overall with the principles of sustainable development (often summarised as ensuring that development meets the needs of the present without compromising the ability of future generations to meet their own needs).

By requiring the updated AoS to be produced alongside the update to the NPS while they are still in draft form, the SEA Regulations and Planning Act 2008 aim to ensure that consultees are able to review and comment on the NPS. This provides a sense of what it would mean in environmental and wider sustainability terms for a new generation of large-scale energy infrastructure to be built in accordance with decisions made on Planning Act applications for development consent which will be decided on the basis of the energy NPS.

Report Structure

The remainder of this report is structured as follows:

Section 2: Overview of AoS process: This section covers the approach taken to the appraisal process, including description of the methodology that has been applied in this update.

Section 3: Scope of the AoS: covers geographical and temporal scope of the updated AoS and how this document fulfils the requirements of the SEA Regulations.

Section 4: Policy context, baseline, issues and framework: presents the updated scoping information that supports the updated AoS.

Section 5: Assessment of material changes to Overarching NPS for Energy (EN-1) following periodic review: presents the findings of the AoS of updated EN-1, including possibilities for mitigation and cumulative effects. It also provides a comparison of the significant sustainability effects of the strategic alternatives and why the updated NPS is the preferred option.

Section 6: Assessment of material changes to Renewable Energy Infrastructure (EN-3) following periodic review: presents the findings of the AoS of updated EN-3 including possibilities for mitigation and cumulative effects. This section also includes an assessment of alternatives for updated EN-3.

Section 7: Assessment of material changes Electricity Networks Infrastructure (EN-5) following periodic review: presents the findings of the AoS of updated EN-5 including possibilities for mitigation and cumulative effects. This section also includes an assessment of alternatives for updated EN-5.

Section 8: Assessment of material changes to the Critical National Priority for Low Carbon Infrastructure policy.

Section 9: Cumulative Effects: presents an overview of anticipated cumulative, synergistic and indirect effects, as well as consideration of cumulative effects in-combination with other plans and policies.

Section 10: Monitoring: This section sets out updated monitoring proposals for the implementation of the NPSs following the periodic review.

The Appendices to this report are published separately and are as follows:

- Appendix A - Glossary & List of Abbreviations
- Appendix B - Response to Consultation
- Appendix C - Review of Policies, Plans and Programmes
- Appendix D - Baseline Data and contextual information
- Appendix E - Baseline Maps (provided in a separate Volume)

2. Overview of the AoS process

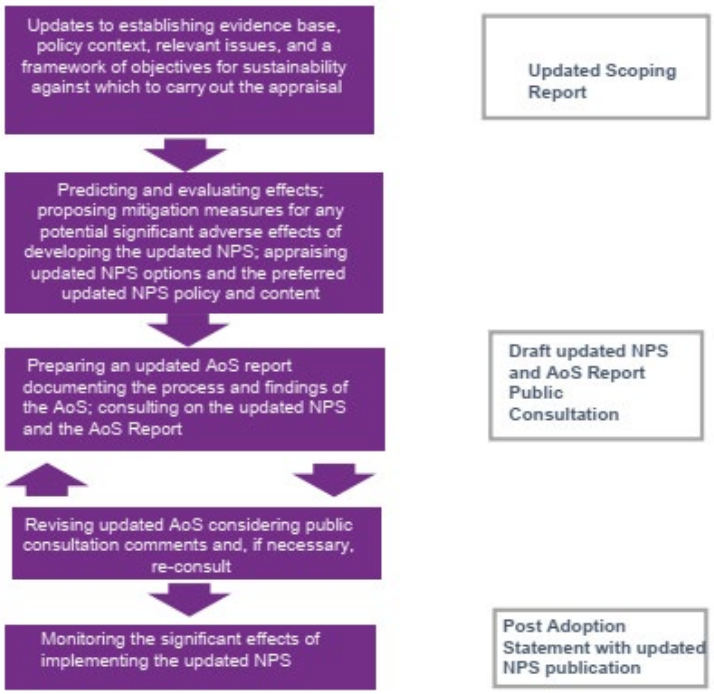
Assessment methodology

The AoS process and methods that have been applied to the assessment of the updated NPSs are broadly 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 ODPM, the Scottish Executive, the Welsh Assembly Government and the 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, 2024 and associated Planning Practice Guidance.

It is to be noted that the processes of SEA and Habitats Regulation Assessment (HRA) are based on European Union (EU) Directives. While the United Kingdom has left the EU, the relevant SEA and HRA Regulations implementing these processes apply at the time of writing this report.

Figure 2-1: Government's guidance for preparing SEAs and Sustainability Appraisals[2]



[2] Based on ODPM (2005) A practical guide to the Strategic Environmental Assessment Directive and ODPM (2005) Sustainability Appraisal of Regional Spatial Strategies and Local Development Documents

The AoS of the periodic review of the NPS has been carried out in a staged approach, with this AoS report representing the 3rd stage in the above Figure 2-1 which demonstrates the various preparation stages of the AoS. The updated NPS and AoS report will be subject to public consultation in April 2025.

The methodology that has been adopted is described below.

Setting the Context and Establishing the Baseline

The NPSs will both influence and be influenced by other plans, policies and programmes (PPPs) produced by local and combined authorities (which will set out the local context in which any infrastructure will be located), by statutory agencies and other bodies with plan making responsibilities. Legislation is a further driver that sets the framework for the NPSs, both directly and indirectly. A review of relevant and up to date legislation, plans and programmes was undertaken and considered to inform the preparation of this updated AoS report.

To predict how NPSs policies will likely affect the future baseline, it is first important to understand its current state and then examine the likely evolution without the implementation of the updated NPSs. The future baseline reflects the conditions which will be influenced by many governmental and sectoral factors, including the existing NPS. This is set out in Section 4. Updated baseline information provides the basis for understanding existing local environmental, economic and social issues, in particular in respect of health, and alternative ways of dealing with them; formulating objectives to address these issues and predicting and monitoring sustainability effects.

Key sustainability issues have been confirmed through analysis of the updated baseline data and review of recent plans and programmes. The identification of these issues helped focus the AoS processes on the aspects that really matter. Implications to NPSs updates and opportunities for how the updated NPSs could assist in addressing these issues were also identified.

A set of updated AoS Objectives has been developed, against which the policies in the updated NPSs could be assessed, specifically in this case for EN-1, EN-3 and EN-5. For each objective, guide questions were set out to form the AoS framework. The assessment aid questions provided a clarification of the intended interpretation of each objective to support direction of change sought through the implementation of the updated NPSs.

The scoping information contained in this report was first refined through prior consultation on the AoS Scoping Report with the statutory consultees identified under the SEA Regulations (including those of England, Northern Ireland, Scotland and Wales). This consultation took place from February to March 2025. The scoping consultation comments were taken on board in preparing this AoS Report (see Appendix B) and updates made are reflected in this report.

Government has decided that an AoS against a separate equality objective is unnecessarily duplicative and difficult to apply at the strategic level of the energy National Policy Statements. Not all AoS have included a specific equality objective. Issues relating to equality are also

addressed through other objectives in the framework, e.g. the objective to improve health and well-being for all citizens and reduce inequalities in health. In reviewing the National Policy Statement, the Secretary of State will be subject to the Public Sector Equality Duty. When considering individual development consent applications, interested parties may make representations on the effect of the proposed development on individuals (including those with protected characteristics), and relevant material considerations should be integrated into the wider assessment of the merits and demerits of the application.

Appraisal of NPSs Policies

The appraisal of the NPSs policies has been undertaken in a topic by topic manner, with the draft overarching NPS for energy (EN-1) tested against each of the 14 AoS objectives (see Section 4). Updates were made to previous assessments to reflect any material change in policy and / or material changes to the updated AoS Framework. The findings of updated AoS-1 are presented in Section 5 by AoS Objective. Where relevant, the interactions between topics have been considered and the commentary is reported against each of the AoS Objectives.

The appraisal of the policies in the updated technology NPSs was undertaken against relevant AoS objectives to reflect non-generic effects associated with the technologies (see Sections 6 to 7).

The appraisal seeks to predict the significant sustainability effects of the updated NPSs. This is done in accordance with the criteria set out in Annex II of the Office of the Deputy Prime Minister (ODPM) guidelines. In predicting effects, changes to the baseline which would occur as a result of implementing the NPS are identified. These changes are then described (where possible) in terms of their geographic scale, the timescale over which they could occur, whether the effects would be temporary or permanent, positive or negative, likely or unlikely, frequent or rare and whether or not they are secondary, cumulative or synergistic.

Quantitative information is not available to help inform the development of predictions in most cases. In such cases, the effects have been predicted based on professional judgement and by reference to relevant legislation and regulations and baseline data. Significance of likely effects was predicted according to the five categories set out in the following table:

Table 2-1: Key to appraising significance of predicted effects

Likely significance of effects		
Significant positive effect likely	**+++**	Policy is expected to address an existing sustainability problem (for example air pollution) or deliver sustainability enhancements, such as substantial environmental net gain above existing/emerging policy.
Minor positive effect likely	**+**	Policy is expected to lead to environmental net gain in line with existing or emerging Government policy OR result in protection and conservation of a sustainability asset (for example, a designated biodiversity site or designated heritage asset).

No effect likely or not applicable	**0**	No perceptible effects expected, or the objective is not relevant to the part of the NPS being assessed.
Minor negative effect likely	**-**	Policy is expected to result in adverse effects of a lower magnitude or smaller scale, which can be mitigated through standard measures and best practice.
Significant negative effect likely	**--**	Policy is expected to result in adverse effects of a greater magnitude or larger scale, which cannot be mitigated OR will require extensive and bespoke mitigation solutions (further studies may be required to identify appropriate solutions).

As noted above, it is important to note that the NPSs are not site-specific and provide a framework for assessing applications for developments of the relevant type in any location. This does mean though that all findings carry a degree of uncertainty as precise effects will ultimately be determined by the nature of the infrastructure and the specific location within which it is developed.

Where beneficial and adverse effects have both been noted, this is shown in relation to the relevant AoS Objective as applicable.

Relationships Between the overarching AoS and the Technology Specific AoSs for Cumulative Effects Assessment

An overarching updated AoS has been undertaken to consider the likely significant effects of implementing the updated EN-1 NPS as a whole, together with the mix of technologies it includes, as well as the likely significant generic effects associated with all major energy infrastructure. Specific effects associated with specific energy technology are detailed in section 6 for Renewable Energy Infrastructure (EN-3) and section 7 for Electricity Networks Infrastructure (EN-5).

The SEA Regulations require consideration of cumulative effects (Schedule 2, Paragraph 6). Cumulative effects on communities and the environment can arise where the effects of several proposed pieces of new energy infrastructure interact. Such effects may be additive, neutralising or synergistic – where the effect of one or more effects acting together is more than the simple sum of the effects when acting alone. For example, a wildlife habitat can become progressively fragmented with limited effects on a particular species until the last fragmentation makes the habitat too small to support the species anymore. Conversely, progressive small additions of habitats may have limited effects individually until a threshold is reached at which the areas and linkages of habitat contribute positively to green infrastructure aims. Clustering of new energy developments can have positive synergistic effects on the local economy, upskilling and community vitality but conversely may have negative cumulative effects on landscape, air quality and local amenity. It may be considered that climate change is the ultimate cumulative effect.

The nature (positive or negative) and significance of any cumulative effects is likely to be associated with the number and types of technology specific infrastructure projects and the

sensitivities of the receiving communities and environment. It is to be noted that the technology specific NPSs do not have any locational specificity and therefore it is difficult to predict any significant cumulative effects. Nonetheless, each energy technology is associated with certain characteristics and an understanding of the potential for cumulative effects was used to identify any key effects and mitigation possibilities.

The significance of cumulative effects may vary with the mix of energy technology projects that are proposed. It is considered that the cumulative effects on certain topics, such as climate change and the economy, may be significant overall at the national level of the NPS, whilst effects on other topics, such as water quality and resources, and biodiversity, are more likely at the regional or sub-regional and local levels. Consideration of interactions and cumulative effects was integral to the appraisal process and addressed in this AoS using professional judgement and evidence from the draft NPSs, the baseline and the plans/programmes review.

The cumulative effects assessment was undertaken both individually for each updated energy NPS and also considering the cumulative effects in combination (see section 2.6 below).

Appraisal of Alternatives

The SEA Regulations also require the environmental assessment of reasonable alternatives to the NPS policies and these alternatives are analysed in Section 5 of this AoS Report for updated EN-1 and Sections 6 to 7 for the AoSs of updated EN-3 and updated EN-5.

It is important to maintain the AoS at a level proportionate to the level of detail within the NPS. For this reason, the strategic alternatives for implementing the aims of the NPS were assessed at a higher level by using six sustainable development themes, identified through aggregating the AoS objectives into topics that better reflected the strategic characteristics of the options (see Table 2-2). The six sustainable development themes included in the AoS for assessing alternatives were informed by the themes previously used in the AoS of the current NPSs to ensure an element of consistency in the approach to assessment of alternatives. Updates to previous assessments have been made where necessary and in particular to address the addition of onshore wind and exclusion of unabated EfW from the NPS.

Table 2-2: Sustainable Development (SD) Themes and AoS Objectives

Scale	Description
Climate Change	Net Zero (1)
Security of Energy Supply	Health (11), Economy (13)
Health & Well-being	Air Quality (8), Health (11)
The Economy	Health (11), Economy (13), Resources (14)
The Built Environment	Transport (12), Heritage (5), Adaptation and Resilience (2)
The Natural Environment	Adaptation and Resilience (2), Biodiversity (3 & 4), Landscapes and Townscapes (6), Water (7), Soils (9), Geodiversity (10)

Note that in consideration of Alternatives, the assessment is undertaken in comparison to the updated EN-1 and as such, the findings of the AoS in respect of the updated EN-1 in Section 5 broadly apply to all of the alternatives – the key differentiator being the inclusion or absence of specific technologies and the relative outcomes of such inclusion or absence. The same broad methodology was applied in relation to alternatives for updated EN-3 and EN-5 with the key differentiator being the inclusion or absence of particular aspects related to the particular technologies and the relative outcomes of such inclusion or absence.

In order to draw comparison between the Alternatives on a broad level, the following scale has been used:

Table 2-3: Differentiator scale for Alternatives

Scale	Description
Large Positive	A materially different positive outcome is anticipated compared to EN-1*
Positive	A more positive outcome is anticipated compared to EN-1*
Neutral	This alternative is anticipated to have the same outcome as EN-1*
Negative	A more adverse outcome is anticipated compared to EN-1*
Large Negative	A materially different adverse outcome is anticipated compared to EN-1*

* EN-3 and EN-5 for technology AoS

Cumulative and Transboundary Effects

Cumulative effects arise where several proposals or elements of the energy NPSs, individually may or may not have significant effect but in-combination have a significant effect due to spatial crowding or temporal overlap. Synergistic effects occur when two or more effects act together to create an effect greater than the simple sum of the effects when acting alone. Cumulative effects can also arise due to effects from the NPSs combining with effects from other plans and policies.

Transboundary effects extend to multiple countries rather than just the UK.

Both types of effects have been considered in relation to the energy NPSs and its updates.

Monitoring the Effects of the NPSs Implementation

Monitoring involves measuring indicators which will enable the establishment of a causal link between the implementation of the plan and the likely significant effect (positive or negative) being monitored. It thus helps to ensure that any adverse effects which arise during implementation, whether or not they were foreseen, can be identified and that action can be taken to deal with them. The monitoring programme prepared in the previous AoS has been updated and is presented in this report.

Consultation on this updated AoS Report

The current suite of energy National Policy Statements (NPSs) were published by the Department for Energy Security and Net Zero (DESNZ) in January 2024. In July 2024 the government launched a review of the energy NPSs to ensure they reflected government's energy priorities as set out in the Clean Power mission. A review of the NPSs were undertaken and EN-1, EN-3 and EN-5 have been updated and an AoS undertaken.

The updated AoS Report is therefore published for public consultation together with the updated NPSs.

Next Steps

The updated draft NPSs will be subject to Parliamentary scrutiny. Government will consider comments received during the public consultation, and the NPSs will be subject to approval by Parliament before final publication. Upon publication of the updated NPSs, an AoS Post Adoption Statement will be published, and this will outline how the findings of the AoS and the responses to consultation have been taken into account. It will also provide further information on how monitoring of the significant effects of implementing the revised NPSs will be carried out.

Habitats Regulations Assessment

A Habitats Regulations Assessment (HRA) report has been prepared for the suite of updated NPSs in a parallel process to the AoS.

In England and Wales, under the Conservation of Habitats and Species Regulations 2017 (as amended), as well as the Conservation of Offshore Marine Habitats and Species Regulations 2017 (together known as 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 habitat site but which are likely to have a significant effect on one or more habitat sites either individually, or in combination with other plans or projects.

Habitat sites include Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) 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 habitat sites. Hereafter, all the above sites are referred to as habitat sites.

Therefore, a HRA report was prepared for the updated NPSs (EN-1, EN-3 and EN-5) and considers the potential effects of publishing the revised NPSs on habitat sites.

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

this point, there are no specific sites, allocations or any spatial component to the NPSs. Therefore, the HRA has purely focused on the policy content within each updated NPS and has been applied in a manner which is consistent with their non-spatial, strategic nature as these NPS do not identify locations to construct new nationally significant infrastructure.

The HRA of the updated NPS noted that while the lack of spatial information within the NPSs made it impossible to reach certainty on the effect of the plan on the integrity of any habitat site, the potential for proposed energy infrastructure projects of the kind contemplated by the NPSs to have adverse effects on the integrity of such sites cannot be ruled out, based on following the precautionary principle. The HRA explains why the Government considers that the NPSs are, nevertheless, justified by imperative reasons of overriding public interest, while noting that its conclusions are only applicable at the NPS level and are without prejudice to any project-level HRA, which may result in the refusal of consent for a particular application.

3. Scope of the AoS

Thematic scope

The SEA Regulations require the analysis of likely significant effects on the environment in an environmental report to include the effects on a range of issues or topics (known as 'SEA Topics'), which are: "biodiversity, population, human health, fauna, flora, soil, water, air, climatic factors, material assets, cultural heritage including architectural and archaeological heritage, landscape and the interrelationship between the above factors". There is also a requirement for the environmental report to include "measures envisaged to prevent, reduce and as fully as possible offset any significant adverse effects on the environment" of implementing the plan or programme. This is what Sections 5 to 8 of this AoS report do for the NPSs that were subject to material changes as part of their update (EN-1, EN-3 and EN-5).

The scoping consultations confirmed that all of the SEA Topics were relevant to the development of energy infrastructure. Table 3-1 identifies the headings under which analysis of these issues is set out in this updated AoS report (particularly in Section 4).

Table 3-1: How SEA Topics are covered by the AoS Objectives

SEA Topics	Objectives used in this AoS
Biodiversity, Fauna and Flora	2. Maximise adaptation and resilience of built assets, communities and people as well as natural assets, habitats and species, to the multiple effects of climate change. 3. Enhance biodiversity and ecological networks, deliver biodiversity net gain, protect and support ecosystem resilience and functionality. 4. Protect and enhance sites designated for their international importance for nature conservation purposes. 7. Protect and enhance the water environment. 8. Protect and enhance air quality on a local, regional, national and international scale.
Population	2. Maximise adaptation and resilience of built assets, communities and people as well as natural assets, habitats and species, to the multiple effects of climate change. 6. Protect and enhance the character and quality of the landscapes, townscapes and waterscapes and protect and enhance visual amenity. 11. Improve health and well-being and safety for all citizens and reduce inequalities in health. 13. To promote a strong economy with opportunities for local communities. 12. Promote sustainable transport and minimise detrimental impacts on strategic transport network and disruption to basic services and infrastructure.

Human Health	2. Maximise adaptation and resilience of built assets, communities and people as well as natural assets, habitats and species, to the multiple effects of climate change. 8. Protect and enhance air quality on a local, regional, national and international scale. 11. Improve health and well-being and safety for all citizens and reduce inequalities in health.
Soil	2. Maximise adaptation and resilience of built assets, communities and people as well as natural assets, habitats and species, to the multiple effects of climate change. 9. Protect soil resources, promote use of brownfield land and avoid land contamination. 10. Protect, enhance and promote geodiversity.
Water	2. Maximise adaptation and resilience of built assets, communities and people as well as natural assets, habitats and species, to the multiple effects of climate change. 7. Protect and enhance the water environment.
Air	8. Protect and enhance air quality on a local, regional, national and international scale.
Climatic Factors	1. Consistent with the national target of reducing carbon emissions to Net Zero by 2050. 2. Maximise adaptation and resilience of built assets, communities and people as well as natural assets, habitats and species, to the multiple effects of climate change. 7. Protect and enhance the water environment.
Material Assets	2. Maximise adaptation and resilience of built assets, communities and people as well as natural assets, habitats and species, to the multiple effects of climate change. 9. Protect soil resources, promote use of brownfield land and avoid land contamination. 10 Protect, enhance and promote geodiversity. 14. Promote sustainable use of resources and natural assets.
Cultural Heritage	2. Maximise adaptation and resilience of built assets, communities and people as well as natural assets, habitats and species, to the multiple effects of climate change. 5. Protect and enhance cultural heritage assets and their settings, and the wider historic environment. 6. Protect and enhance the character and quality of the landscapes, townscapes and waterscapes and protect and enhance visual amenity.
Landscape	6. Protect and enhance the character and quality of the landscapes, townscapes and waterscapes and protect and enhance visual amenity

Geographical scope

The updated AoS applies to the same geographical area of the updated NPSs – namely England and Wales, though in certain circumstances elements will apply to Scotland. The Energy NPSs do not apply to Northern Ireland.

Potential effects have been considered across a range of geographic scales (including international, UK, regional and local). However, as the NPSs do not prescribe the location for new infrastructure projects, there are limitations in terms of appraising those effects that are site specific in nature. This is not to exclude the possibility that they could be significant but rather to indicate that such effects may only be effectively judged as significant at the project level (for example, increases in noise or vibration levels from a new access road affecting a local housing settlement). This explains why effects that may be quite intensely felt at local level do not always register as strategically significant in the scoring sections of the assessment.

The assessment of project level effects will be given full consideration at the application for development consent, as detailed in the updated NPSs, particularly through Environmental Impact Assessment (EIA), and, where relevant, Habitats Regulations Assessment (HRA).

Temporal scope

The temporal scope of the AoS is aligned with that for the updated NPSs, which remain in force in their entirety unless withdrawn or suspended in whole or in part by the Secretary of State. It is to be noted that the NPSs will be subject to review in order to ensure they remain appropriate.

It should also be noted, that the updated AoS considers the full lifetime of any individual energy related development which might arise from the reviewed NPSs and that includes the construction, operation and decommissioning stages.

The effects of a policy, plan or programme sometimes change over time for a number of reasons. This has been reflected in the appraisal. In this context, for the purposes of the appraisal, the “short term” has been defined as the effects arising generally during the infrastructure construction period typically 2-7 years (different technologies have different construction times); the “medium term” as typically between 5 and 30 years (operational lifetimes vary with the characteristics of different technologies); and the “long term” as beyond 30 years (and including decommissioning where relevant).

Review of Policies, Plans and Programmes

The SEA Regulations requires a report containing:

'an outline of the contents, main objectives of the plan or programme and relationship with other relevant plans and programmes' (Schedule 2, Paragraph 1)

'the environmental protection objectives, established at international, (European) Community or Member State level, 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)

The review of international and national plans, policies and programmes (PPP) is a valuable element of the AoS process as it assists with the following:

- The identification of environmental, social and economic objectives of other relevant plans or programmes that should guide the identification of sustainability issues;
- The development of the AoS framework which should comprise sustainability objectives; and
- Determining whether there are any clear potential conflicts or challenges between the PPP and the emerging policy which is the subject of the AoS process. Note that there are a number of policy levers other than the planning regime which government can and does use to try to achieve its overall objectives in relation to the Energy sector. In the energy NPSs and their AoSs, we are concerned only with those policies which relate to land use and help set the framework for development consent.

The international and national PPP that have been reviewed are listed below and details of the review presented in Appendix C. This includes those PPPs identified in the last iteration of the AoS, as well as those identified (including from consultation responses) as part of the AoS of the updated NPS. Those marked with * are additions.

INTERNATIONAL

Biodiversity

- Convention on Biological Diversity 2010.
- Kumming-Montreal Global Biodiversity Framework 2023.
- Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) 1989.
- Ramsar Convention 1971.
- Convention on the Conservation of Migratory Species of Wild Animals 1979 (Bonn Convention).
- Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA)*.

Climate Change

- UN Framework Convention on Climate Change 1992, Kyoto Protocol 1997, Paris Agreement 2015.
- UK-EU TAC Agreement 2021.

Heritage

- World Heritage Convention 1972.
- Convention on the Protection of Underwater Cultural Heritage 2001.
- Convention on the Protection of the Archaeological Heritage (1992) – the 'Valetta Convention'.

Landscape

- European Landscape Convention 2000 – the 'Florence Convention'.

Marine Environment

- The OSPAR Convention 1992 (Convention for the Protection of the Marine Environment of the North-East Atlantic).
- The UN Convention for the Law of the Sea 1982 (UNCLOS)*.
- The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 (London convention)*.
- 1996 Protocol to The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 (London Protocol 1996)*.

Noise

- WHO Guidelines for Community Noise 1999.
- WHO Night Noise Guidelines for Europe 2009.
- WHO Environmental Noise Guidelines for the European Region 2018*.

Human Health

- WHO Closing the Gap: Social Determinants of Health 2008.
- Espoo Convention on Environmental Impact Assessment in a Transboundary Context 1991.
- Aarhus Convention 2001.

NATIONAL

Cross – thematic

- Environmental Protection Act 1990.
- Environment Act 2021.

- Clean Growth Strategy 2017.
- UK Sustainable Development Strategy 2005.
- UK Shared Framework for Sustainable Development; One Future – Different Paths 2005.
- The Planning Act 2008.
- Environmental Permitting (England and Wales) Regulations 2016.
- The Town and Country Planning and Infrastructure Planning (Environmental Impact Assessment) (Amendment) Regulations 2018.
- Localism Act 2011.
- Environmental Assessment of Plans and Programmes Regulations 2004.
- Planning Practice Guidance – Natural Environment 2019.
- Levelling Up and Regeneration Act 2023*.

Biodiversity

- Wildlife and Countryside Act 1981.
- Countryside and Rights of Way Act 2000 (CROW Act).
- Conservation of Habitats and Species Regulations 2017 as amended by The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019.
- The Conservation of Offshore Marine Habitats and Species Regulations 2017.
- National Pollinator Strategy 2014-2024.
- The Great Britain Invasive Non-native Species Strategy 2023.
- The Invasive Alien Species (Enforcement and Permitting) Order 2019.
- National Parks and Access to Countryside Act 2006.
- Natural Environment and Rural Communities Act 2006.
- The Economics of Biodiversity: The Dasgupta Review, 2021.
- National Forest Inventory, 2024*.
- Hedgerow Regulations 1997.
- UK Peatland Strategy 2018*.

Air Quality

- Air Quality Standards Regulations 2010 as amended by The Air Quality (Amendment of Domestic Regulations) (EU Exit) Regulations 2019.
- Air Quality Strategy: framework for local authority delivery 2023*.
- Clean Air Strategy 2019.
- Air Quality Plan for Nitrogen Dioxide in the UK, 2017.

- Air Pollution: Action in a Changing Climate (Defra, 2010)

Climate Change

- Climate Change Act 2008 and its 2050 Target Amendment Order, 2019.
- UK Net Zero Strategy 2021.
- The Road to Zero 2018.
- UKCP18.
- Industrial Decarbonisation Strategy 2021.
- National Infrastructure Strategy 2020.
- National Infrastructure Assessment 2023*.
- UK Climate Change Risk Assessment 2022, Presented to Parliament pursuant to Section 56 of the Climate Change Act 2008.
- The Third National Adaptation Programme (NAP3) and the Fourth Strategy for Climate Adaptation Reporting 2023, Presented to Parliament pursuant to Section 58 of the Climate Change Act 2008.
- Climate Change: Second national adaptation programme (2018-2023).
- Planning Practice Guidance – Climate Change 2019.
- Climate, people, places and value Design principles for national infrastructure, National Infrastructure Commission, 2021.
- Independent Assessment of UK Climate Risk, Committee on Climate Change 2021.

Heritage

- Historic Buildings and Ancient Monuments Act 1953.
- Heritage Protection for the 21st Century 2007.
- Ancient Monuments and Archaeological Areas Act 1979.
- Protection of Military Remains Act 1986.
- National Heritage Act 1983 (as amended 2002).
- The Protection of Wrecks Act 1973.
- Heritage Statement: One Year On (2018).
- Planning (Listed Buildings and Conservation Areas) Act 1990.
- National Parks and Access to the Countryside Act 1949.

Landscape

- National Parks and Access to the Countryside Act 1949.
- Norfolk and Suffolk Broads Act 1988.
- Environment Act 1995.

- Countryside and Rights of Way Act 2000 (CROW Act).

Water Environment

- Water Resources Act 1991.
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017.
- Flood and Water Management Act 2010.
- River Basin Management Plans.
- Shoreline Management Plans and Guidance 2006.
- Flood Risk Management Plans.
- Salmon and Freshwater Fisheries Act 1975.
- Eels (England and Wales) Regulations 2009.
- Fisheries Act 2020.
- Marine and Coastal Access Act 2009.
- The Marine Works (Environmental Impact Assessment) Regulations 2007*.
- UK Marine Policy Statement 2011.
- UK Marine Strategy.
- Marine strategy part one: UK updated assessment and Good Environmental Status, 2019.
- Marine Strategy Part 2, 2021.
- Marine Strategy Part 3, 2025: UK programme of measures*.
- Urban Wastewater Treatment Regulations 1994.
- Water Industry Act 1991.
- Storm Overflow Discharge Reduction Plan.
- Reservoirs Act 1975.
- Water Resources Infrastructure National Policy Statement.
- Water Act 2003 and 2014
- Water Resource Management Plans

Noise

- Environmental Noise (England) Regulations 2006 (as amended)
- JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys 2017*.
- JNCC Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise 2010*.

- JNCC guidelines for minimising the risk of injury to marine mammals from unexploded ordnance (UXO) clearance in the marine environment*.

Transport

- Decarbonising Transport: A Better, Greener Britain 2021*.

Energy

- The Energy White Paper. Powering Our Net Zero Future 2020.
- Energy Act 2023*.
- The Ten Point Plan for a Green Industrial Revolution 2020.
- British Energy Security Strategy 2022.
- Energy Innovation Programme (EIP) (2015-2021).
- Net Zero Innovation Portfolio and Advanced Nuclear Fund (2021-2025).
- Powering up Britain: The Net Zero Growth Plan 2023.
- UK Government Clean Power 2030 Action Plan: A new era of clean electricity 2024*.

Note that the AoS follows closely the five principles of the Environmental Principles Policy Statement that is set out within section 17(5) of the Environment Act 2021. The UK government has already committed to these principles through international instruments and processes. The five principles are:

- Integration: look at opportunities to embed environmental protection and/or enhancement
- Prevention: prevent environmental harm before it occurs or contain existing damage
- Rectification at source: environmental damage should be addressed at its origin to avoid the need to remedy its effects later
- Polluter pays: the costs of pollution should be borne by those causing it
- Precautionary: where there are threats of serious or irreversible environmental damage, a lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation

The purpose of these principles is to guide ministers and policymakers towards opportunities to prevent environmental damage and enhance the environment, though it is important to note that the principles are not rules and they cannot dictate policy decisions by government ministers.

DEVOLVED ADMINISTRATIONS / LOCAL

England

Cross - thematic

- Environmental Improvement Plan (25 Year Environment Plan 2018, EIP23 and all future revisions).
- National Planning Policy Framework updated December 2024*.
- Environmental Damage (Prevention and Remediation) (England) Regulations 2015 as amended by The Environmental Damage (Prevention and Remediation) (England) (Amendment) Regulations 2019.
- MMO Marine Character Areas (2018)*.
- Natural England (2023). Geoconservation: Principles and Practice (NE802)*.

Biodiversity and Green infrastructure

- Biodiversity 2020: A strategy for England's wildlife and ecosystem services.
- The Town and Country Planning (Trees Preservation) (England) Regulations 2012.
- The Environmental Targets (Biodiversity) (England) Regulations 2022.
- The Environmental Targets (Woodland and Trees Outside Woodland) (England) Regulations 2022.
- England Trees Action Plan 2021-2024.
- Government Forestry and Woodlands Policy Statement 2013.
- 30x30 Government Commitment 2024*.
- Nature Recovery Network, Defra and Natural England 2024*.
- Nature for Climate Fund.
- The Green Book, Central government guidance on appraisal and evaluation 2024*
- Introduction to the Green Infrastructure Framework - Principles and Standards for England, Natural England 2023*.
- Natural England's Green Infrastructure Standards for England 2023*.
- Natural England's climate change risk assessment and adaptation plan 2021 (published 2022). Climate change adaptation reporting: third round.
- Nature Networks Evidence Handbook (NERR081) Natural England 2020.
- The Environmental Benefits from Nature Tool - Beta Test Version, Natural England 2024*.
- Biodiversity Metric Calculation Tool, Natural England 2023*.
- Carbon Storage and Sequestration by Habitat, Natural England 2021.
- Climate Change Adaptation Manual. Evidence to support nature conservation in a changing climate, RSPB, Natural England, 2020.
- Local Nature Recovery Strategies Policy Paper June 2023*.
- The Biodiversity Gain Requirements Regulations 2024*.
- Making Space for Nature 2010*.

- Defra Policy paper: Notice of designation of sensitive catchment areas 2024*.
- England Peat Action Plan 2021*.

Landscape

- National Character Areas (England), Natural England 2023.
- English National Parks and Broads UK Government Vision and Circular 2010.

Water Environment

- National Flood and Coastal Erosion Risk Management Strategy for England 2020.
- The Environmental Targets (Water) (England) Regulations 2022.
- The Environmental Targets (Marine Protected Areas) Regulations 2022.
- Regional Water Resource Plans.
- Meeting our future water needs: a national framework for water resources.
- Abstraction licensing strategies.
- Contaminated Land (England) Regulations 2006 as amended by the Contaminated Land (England) (Amendment) Regulations 2012 (in relation to controlled waters).

Air Quality

- The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023*.

Human Health

- Public Health England – Strategy (2020-2025)*.
- Contaminated Land (England) Regulations 2006 as amended by the Contaminated Land (England) (Amendment) Regulations 2012.

Soils

- Safeguarding our Soils: a strategy for England 2009.

Waste

- Waste (England and Wales) Regulations 2011 as amended by The Waste (England and Wales) (Amendment) Regulations 2014.
- National Review of Waste Policy in England 2011.
- Waste Management Plan for England 2021.
- Waste Prevention Programme for England 2023*.
- Resources and Waste Strategy for England, DEFRA and Environment Agency 2018.
- National Planning Policy for Waste 2014.
- The Environmental Targets (Residual Waste) (England) Regulations 2022.

Noise

- Noise Policy Statement for England 2010.
- Environmental Noise (England) Regulations 2006 as amended
- Defra Policy Paper - Reducing Marine Noise

Wales

Cross – thematic

- Environmental Damage (Prevention and Remediation) (Wales) Regulations 2009.
- Future Wales – The National Plan 2040.
- Environment (Wales) Act 2016.
- Wellbeing of Future Generations (Wales) Act 2015.
- State of Natural Resources Report (SoNaRR) for Wales 2020.
- Natural Resources Policy (Welsh Government) 2017.
- Planning Policy Wales (Edition 12, 2024)*.
- Welsh National Marine Plan 2019.
- One Wales: One Planet – the Sustainable Development Scheme for Wales (2009).
- Welsh Government Rural Communities - Rural Development Programme (2014-2020).
- TAN 5: Nature Conservation and Planning 2009.
- TAN 6: Planning for Sustainable Rural Communities 2010.
- TAN 11: Noise 1997.
- TAN 13: Tourism 1997.
- TAN 15: Development, Flooding and Coastal Erosion 2021*.
- TAN 16: Sport, Recreation and Open Space (2009).
- TAN 18: Transport 2007.
- TAN 21: Waste 2014.

Climate Change

- The Climate Change Strategy for Wales (2010).
- Net Zero Wales: Carbon Budget 2 (2021 – 2025)*.
- Policy Statement on Local ownership of energy generation in Wales – benefitting Wales today and for future generations.
- Prosperity for All: A Climate Conscious Wales (2019).
- Adapting to Climate Change: Guidance for Flood and Coastal Erosion Risk Management Authorities in Wales 2022.

Waste

- The Waste (Miscellaneous Provisions) (Wales) Regulations 2012.

Biodiversity

- The Town and Country Planning (Trees) (Amendment) (Wales) Regulations 2017.
- The Town and Country Planning (Development Management Procedure) (Wales) Order 2012 as amended by The Town and Country Planning (Development Management Procedure) (Wales) (Amendment) Order 2017.
- Woodlands for Wales 2018*.

Contaminated Land

- The Contaminated Land (Wales) Regulations 2006 as amended by the Contaminated Land (Wales) (Amendment) Regulations 2012.

Heritage

- Historic Environment Act (Wales) 2023*.
- The Welsh Historic Environment Strategic Statement: Action Plan 2010.
- Technical Advice Note 24: The Historic Environment 2017*

Water Environment

- Water Strategy for Wales 2015.
- Flood and Water Management Act 2010.
- National Strategy for Flood and Coastal Erosion Risk Management in Wales 2020.
- Welsh National Marine Plan (Welsh Government 2019).
- Flood Consequence Assessments: climate Change Allowances 2021*.
- Shoreline Management Plans applicable in Wales.

Landscape

- Valued and Resilient: The Welsh Government's Priorities for Areas of Outstanding Natural Beauty and National Parks (July 2018).

Energy

- Natural Resources Wales Technical Guidance.

Transport

- Llwybr Newydd: the Wales Transport Strategy 2021.

Scotland

Cross – thematic

- Town and Country Planning (Environmental Impact Assessment) (Scotland) 2017.
- The Town and Country Planning (Development Management Procedure) (Scotland) Regulations 2013.
- National Planning Framework 4 (2023).
- Planning Advice Note (PAN) 3/2010 Community Engagement.
- PAN 33 Development of Contaminated Land (Revised Oct 2000).
- PAN 51 Planning, Environmental Protection and Regulation (Revised 2006).
- PAN 2/2011 Planning and Archaeology (2011).
- PAN 71 Conservation Area Management (2004).
- PAN 60 Planning for Natural Heritage (2000).
- PAN 1/2011 Planning and Noise (2011).
- PAN 61 Waste Management Planning (2001).

Heritage

- Historic Environment Policy for Scotland 2019.
- Our Past, Our Future, The Strategy for Scotland's Historic Environment 2023*.

Biodiversity

- The Nature Conservation (Scotland) Act 2004 (Authorised Operations) Order 2011.
- Scottish Biodiversity Strategy to 2045 (2022).
- Wildlife and Natural Environment (Scotland) Act 2011 (as amended).
- Scotland's Forestry Strategy 2019-2029.
- Forestry and Land Management (Scotland) Act 2018.
- Forestry (Felling) (Scotland) Regulations 2019.
- Control of Woodland Removal 2012.
- The Town and Country Planning (Tree Preservation Order and Trees in Conservation Areas) (Scotland) Regulations 2010.

Waste

- The Waste (Scotland) Regulations 2012.
- Scotland's Zero Waste Plan 2010.

Air Quality

- The Air Quality Standards (Scotland) Regulations 2010.
- The Air Quality (Scotland) Amendments Regulations 2016.

- Cleaner Air for Scotland – the Road to a healthier future (the Scottish Government 2015).

Contaminated Land

- Contaminated Land (Scotland) Regulations (2000 and 2005).

Noise

- Environmental Noise (Scotland) Regulations (2006) (as amended).

Climate Change

- Climate Change (Scotland) Act 2009.
- Climate Change (Emissions Reduction Targets) (Scotland) Act 2019.
- Securing a Green Recovery on a Path to Net Zero: climate change plan 2018–2032 – update.
- Climate Ready Scotland Scottish Climate Change Adaptation Programme (2019-2024).

Water Environment

- The Water Environment (Controlled Activities) (Scotland) Regulations 2011.
- The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017.
- Scotland's National Marine Plan 2015.
- The Marine Scotland Act 2010.

Energy

- Scottish Energy Strategy: The Future of Energy in Scotland 2017.

Northern Ireland

Cross – thematic

- Environment Strategy for Northern Ireland 2023*.

Marine Environment

- Marine Plan for Northern Ireland 2022.

Climate Change

- The Path to Net Zero Energy: Secure, Affordable, Clean 2021.
- Climate Change Act (Northern Ireland) 2022.

A series of tables contained in Appendix C present the review of PPP and document the following:

- The primary objectives of the documents including their environmental protection objectives where appropriate;
- Key indicators and targets of relevance in the documents; and
- How the objectives within the plans and programmes have been taken into consideration in the AoS and NPS processes.

The review of PPPs revealed a large number of common themes in terms of their objectives relating to sustainability within the context of strategic development planning, including:

Biodiversity and the Natural Environment

- Protection of sites designated for nature conservation purposes
- Protect and enhance endangered or important species and habitats, including those considered irreplaceable i.e. those which would be technically very difficult (or take a very significant time) to restore, recreate or replace once destroyed, taking into account their age, uniqueness, species diversity or rarity. Such examples would include ancient woodland, ancient and veteran trees, blanket bog, limestone pavement, coastal sand dunes, salt marsh and lowland fen
- Contribute to the delivery of biodiversity strategies and plans
- Increase important habitat
- Protect, maintain and where possible enhance natural habitat networks and green infrastructure, to avoid fragmentation and isolation of networks
- Contribute to the achievement of Biodiversity Net Gain
- Contribute to delivering multi-functional Green Infrastructure – note this will also have implications in addition to biodiversity across a range of themes such as climate change, air quality, water quality and so on
- Contribute to the achievement of Environment Net Gain
- Support ecosystem resilience
- Contribute to addressing the problem of Invasive Non Native Species, including eradication and prevention of spread
- Contribute to the long-term biodiversity target for species' extinction risk in England which is to reduce the risk of species' extinction by 2042, when compared to the risk of species' extinction in 2022
- Contribute to the long term target of at least 16.5% of all land in England covered by woodland and trees outside woodland by end of 2050

Geodiversity

- Protection of sites designated for geodiversity importance
- Improve access to sites of geodiversity interest
- Maintenance of natural shoreline processes / management of shorelines

Greenhouse gas (GHG) Emissions

- Reduce GHG emissions, particularly CO2
- Maximise the use of renewable energy
- Minimise embedded carbon in development
- Encourage green infrastructure to help with carbon sequestration
- Increase energy efficiency and make use of new technology
- Minimise use of fossil fuels
- Contribute to the achievement of Net Zero Carbon target

Adaptation to a Changing Climate and Flooding

- Prepare for extreme weather events and sea level rise
- Minimise the risk and impact of flooding
- Avoid development in floodplains when possible
- Help meet objectives of Flood Risk Management Plans allowing for climate change
- Utilise Natural Flood Management

Air Quality and Noise

- Do not cause additional Air Quality Management Areas (AQMA) to be designated, or Noise Important Areas (NIA) to be identified.
- Reduce emissions of Nitrogen Dioxide (NO2)
- Reduce emissions from transport (roads in particular)
- Increase use of low emission / zero emission at point of use vehicles
- Increase convenience and use of sustainable transport modes; including for construction
- Encourage use of green infrastructure to address pollution distribution and improve local air quality
- Reduce effects of noise (and vibration) on people and the natural environment including underwater.
- Reduce emissions of PM10 and PM2.5[3] and population exposure to PM2.5.

[3] Particulate matter (PM) is everything in the air that is not a gas. PM10 is particulate matter less than 10 micrometres in diameter. PM2.5 is less than 2.5 micrometres in diameter.

- By the end of 31st December 2040, the annual mean level of PM2.5 in ambient air must be equal to or less than 10 µg/m³ (in England) and population exposure must be reduced by 35% compared to 2018 levels

Water Resources

- Protect and improve the quality of groundwater, inland surface water, transitional waters, coastal and marine waters
- Note specific groundwater protection may be required for certain nuclear facilities
- Help to meet objectives of the Water Framework Directive (WFD)4 and the relevant River Basin Management Plan, as well as Shoreline / Estuarine Management Plans and Special Protection Zones
- Consider how climate change may alter rainfall patterns and water availability
- Make use of Sustainable Drainage Systems (SuDS)
- Enable the sustainable use of water for people, business, and the environment.

Land Use, Soil and Agriculture

- Prioritise development on brownfield sites
- Seek to reclaim derelict and land affected by contamination
- Protect farmland and soils - particularly those of the best value
- Recognise the finite nature of soil
- Ensure appropriate management and storage of soils during construction

Cultural Heritage

- Conserve and protect historic assets (designated and undesignated) and those of cultural note
- Increase awareness of buried archaeology / unknown heritage – recognise that some historic assets can be offshore
- Protect and enhance the setting of cultural heritage assets – this can include at a landscape scale

[4] Note that following the United Kingdom's withdrawal from the European Union (EU), reference to assessment processes derived from the requirements of legislation based in EU Directives was amended to make it clearer that the requirement was now through retained UK law. As such, reference is now frequently made to Water Environment Regulations (WER) assessments instead of WFD assessments. However, for the purpose of this AoS the terminology of WFD assessment will be retained in order to ensure consistency with the wider Energy NPS AoS and as it is a widely understood and frequently used term.

- Improve access to historic assets, including buildings and landscapes of value where appropriate
- Sympathetic design and use of vernacular architecture when appropriate to enhance the local character and ‘sense of place’

Landscapes and Townscapes

- Protect those areas designated or recognised for landscape value, including on a local scale and further enhance their statutory purposes
- Protect and enhance landscape and townscape character and local distinctiveness, including those areas with a sense of wildness and remoteness
- Consider how landscape planning can act in a cross cutting fashion e.g. carbon sequestration
- Protect tranquillity from noise and light pollution
- Foster good design quality for all new development
- Promote regeneration of previously developed land when appropriate

Natural Resources and Waste

- Ensure efficient resource use and minimise resource footprint
- Use secondary and recycled materials
- Consider opportunities to maximise on-site re-use of materials
- Employ waste reduction methods to minimise construction and maintenance waste
- Reduce residual waste i.e. the amount of waste sent to energy recovery facilities or disposed of at landfill and incinerated without energy recovery
- Recover energy and materials from waste (anaerobic digestion, incineration with energy recovery and pyrolysis)
- Promote circular economy
- Long-term target to ensure that the total mass of residual waste per head of population in England does not exceed 287 kilograms by 31st December 2042

Economic Themes

- Improve physical accessibility to jobs through the location of employment sites and transport links close to areas of high unemployment
- Widen the number and range of accessible employment opportunities and support growth in employment and labour productivity

- Improve attractiveness for inward investment
- Improve rail and road journey reliability for business users
- Support local businesses and local supply chain
- Support enhancement of local economy and overall prosperity
- Support development of the skills base through training and apprenticeships

Social Themes

- Distinctive development that recognises, reflects and enhances the ‘sense of place’ and ‘sense of community’
- Self-sufficient, resilient and adaptable communities
- Communities that will develop roots and connections between people
- Access to a mix of affordable housing to meet the needs of all sections of society, at different phases of life
- Access to social facilities – community, cultural, health and leisure / recreational
- Access to transport with an emphasis on active, low carbon and sustainable modes
- Access to and provision of modern and robust infrastructure, including digital, to allow connected communities
- Access to Open Space and Green and wellbeing Infrastructure
- Access to educational, training and employment opportunities

Health & Community Themes

- Tackle poor health by improving the health of everyone, and of the worst off in particular
- Tackle, where possible, specific issues that can affect health e.g. poor air quality
- Reduce health inequalities among different groups in the community (e.g. young children, pregnant women, black and minority ethnic people; older people, people with disabilities; low income households)
- Support the public to make healthier and more informed choices with regard to their health and adopt physically active lifestyles
- Address pockets of deprivation
- Provide physical access for people with disabilities
- Provide or improve access to local health and social care services
- Provide opportunities for increased exercise, thus reducing obesity, particularly in children, and illnesses such as coronary heart disease
- Provide for an ageing population

- Promote healthy lifestyles through exercise, physically active travel and access to good quality and affordable food, which can assist in reducing both physical and mental illnesses

Equalities Themes

- Protect human rights (e.g. the right to liberty and security of person) and fundamental freedoms (e.g. a right to freedom of thought, conscience and religion, freedom of expression, etc.)
- Prohibit discrimination, harassment and victimisation on such grounds as sex, race, language and religion
- Promote equality of opportunity in the way services are planned, promoted and delivered
- Treat everyone with dignity and respect
- Recognise people's different needs, situations and goals and remove the barriers that limit what people can do and can be
- Create sustainable communities that are active, inclusive, safe, fair, tolerant and cohesive
- Create sustainable communities that are fair for everyone - including those in other communities, now and in the future
- Improve economic, social and environmental conditions, particularly in the most deprived areas
- Ensure fair access to and distribution of resources across the community, including rural areas
- Assess and address the impacts upon diverse communities including cultural, racial, economic, generational, social (including disabilities) and religious mixes
- Create a sense of belonging and well-being for all members of the community
- Provide physical access for people with disabilities
- Minimise isolation for vulnerable people

Baseline information and key issues

The SEA Regulations require identification and characterisation of:

'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)

'the environmental characteristics of areas likely to be significantly affected'. (Schedule 2, paragraph 3)

'any existing environmental problems which are relevant to the plan or programme including, in particular, those relating to any areas of particular environmental importance, such as areas designated pursuant to Directive 79/409/EEC and 92/43/EEC'. (Schedule 2, Paragraph 4)

This section sets out an overview of the baseline information used to help inform development of the updated AoS framework and the assessment of the NPS. The AoS has been undertaken to assess NPSs which have national implications and the approach to the baseline data collation process that has been adopted involved the collation of higher-level national data.

Appendix D sets out national baseline information that has been collated (and updated in 2024 / early 2025 to inform the updated AoS). An overview of national information for each topic is as follows.

Table 4-1: Summary of national baseline information

Topic	Baseline Information (national)
Climate Change & Greenhouse Gas Emissions	Distribution of greenhouse gas emissions Contribution of sectors to greenhouse gas emissions Predicted changes to temperature and weather patterns
Biodiversity and Ecosystems	Special Protection Areas Special Areas of Conservation Ramsar sites National Nature Reserves and Local Nature Reserves Sites of Special Scientific Interest (England, Scotland, Wales) and Areas of Special Scientific Interest (Northern Ireland) Marine Conservation Zones (England, Wales, Northern Ireland) – note these also align with Highly Protected Marine Areas (HPMAs) Nature Conservation Marine Protected Areas (Scotland) Ancient Woodland Priority Habitat Biosphere Reserves Chalk Rivers (England only)

	Biodiversity Targets Protected Species Nature Recovery Network Climate change adaptation risk and opportunities for biodiversity
Communities – Population, Employment, and Viability	Population Location of major settlements and areas of population Working age population Unemployment Economic Activity Rates
Communities – Supporting Infrastructure	Location of strategic rail links Location of strategic road network Location of airports Location of ports Gas Network High Voltage Electricity Network Offshore Wind Farms Nuclear Power Stations
Health and Wellbeing	Radioactivity levels in the environment The Index of Multiple Deprivation (England) The Scottish Index of Multiple Deprivation The Welsh Index of Multiple Deprivation Northern Ireland Multiple Deprivation Measure The Measuring National Well-Being Programme National Trails (England and Wales), Scotland's Great Trails Country Parks

	National Cycle Networks Coastal Paths (See also Air Quality and Noise below)
Historic Environment	World Heritage Sites Scheduled Monuments Historic Battlefields Parks and Gardens Protected Wrecks Listed Buildings Conservation Areas Historic Landscape Characterisation Areas of Archaeological Importance Heritage at Risk Registered Historic Landscape
Landscape, Townscape, and Seascape	National Parks National Landscapes (formerly known as Areas of Outstanding Natural Beauty) in England, Wales and Northern Ireland, as well as National Scenic Areas (Scotland) Heritage Coasts (England and Wales) National Character Areas (England) Seascape Character Areas (England and Wales) Green Belt Local Landscape Character Assessments Local Landscape Sensitivity Assessments

Air Quality	Air Quality Management Areas Noise Important Areas
Soils, Geology, and Land Use	Sites of Special Scientific Interest (England, Scotland, Wales) and Areas of Special Scientific Interest (Northern Ireland) National Soil Map Contaminated Land UNESCO Global Geoparks Agricultural Land Classification
Water Quality and Resources	Water Framework Directive (WFD) ecological and chemical status River Basin Management Plans Bathing Water Quality Marine Strategy Framework Directive environmental status Groundwater Source Protection Zones Drinking Water Protected Areas
Flood Risk and Coastal Change	Flood Zones (England, Scotland, Wales) and Flood Risk Areas (Northern Ireland) Location of Fluvial and Tidal Floodplains and Shoreline Management Plans Shoreline Management Plans Predicted changes to temperature and weather patterns
Resources and Waste	Sector waste statistics Active Landfill Sites Mineral safeguarding and exploration zones Exploration Licences

Note that baseline data have been predominantly compiled through interpretation of open source, official and readily available data and statistics and includes, where relevant, the

interpretation of Geographic Information Systems spatial data. While baseline review and data searches have been undertaken through late 2024 and January 2025 in order to provide a comprehensive basis from which to develop the updated AoS Framework, it is to be recognised that some sources are subject to infrequent review, maintenance or update. Where available, source publishing dates or 'last updated' dates have been included in the baseline update and reference provided as footnotes.

Appendix D is supported by a range of figures set out in Appendix E which show the geographical distribution of some of the key designations and land uses across England and Wales. Table 4-2 provides a summary of the data presented on these figures. Note that mapping is available and has been considered for Scotland and Northern Ireland, but due to size it is not provided. An indication is provided in brackets of whether an information layer only applies to a specific part of the UK.

Table 4-2: Key designations and land use across the United Kingdom

Figure	Key designations/land use considered
Figure 1: **Biodiversity and Ecosystems**	Special Protection Areas Special Area of Conservation Ramsar sites Sites of Special Scientific Interest (England, Scotland, Wales) and Areas of Special Scientific Interest (Northern Ireland) National Nature Reserves Ancient Woodland Inventory (England and Scotland) Marine Conservation Zones (England, Wales, Northern Ireland) Nature Conservation Marine Protected Areas (Scotland) Biosphere Reserves
Figure 2: **Infrastructure**	Location of urban Areas Location of strategic rail links Location of strategic road network Location of airports Location of ports
Figure 3:	Protected Wrecks (England)

Historic Environment	World Heritage Sites Scheduled Monuments (England and Scotland) Historic Battlefields (England and Scotland) Parks and Gardens (England and Scotland)
Figure 4: **Landscape / Health and Wellbeing**	Areas of Outstanding Natural Beauty National Parks Heritage Coasts (England and Wales) National Trials (England)
Figure 5: **Air Quality**	Air Quality Management Areas
Figure 6: **Flood Risk**	Flood Risks Zones (England) Flood Risk Areas (Northern Ireland)

Note that while the above noted Figures depict a range of key designation and land use across England and Wales, the scale at which this mapping is presented does not allow for the full granularity of data of relevance. Underpinning many of the above noted aspects are a series of more 'local' designations and land uses which are also sustainability considerations. These include, for example, sites designated as Local Nature Reserves, Sites of Nature Conservation Importance, Noise Important Areas, non-designated heritage assets, listed buildings, conservation Areas, Special Landscape Areas, Areas of Great Landscape Value, areas of contaminated land and so on. It is important to recognise that such designations, assets and features would need to be considered during the design and planning process for any NSIP planning application, including through Environmental Impact Assessment.

Key Issues

The SEA Regulations require identification and characterisation of:

'any existing environmental problems which are relevant to the plan or programme including, in particular, those relating to any areas of particular environmental importance, such as areas designated pursuant to Directive 79/409/EEC on the conservation of wild birds and the Habitats Directive'. (Schedule 2, paragraph 4)

The baseline data provides an overview of the sustainability characteristics of the United Kingdom, with a particular focus on England and Wales. This overview, together with contextual information, is presented in Appendix D.

The analysis of the baseline and likely evolution without the NPS has highlighted several key issues. These, together with implications and opportunities arising for the NPS, have been summarised in Table 4-3. Note that due to the geographical scope of the NPS, this summary of key sustainability issues is focused on England and Wales, along with the United Kingdom as a whole as appropriate. Further detail on Scotland and Northern Ireland is provided in the baseline and contextual information contained within Appendix D.

It should be noted that some issues are cross-cutting and affect several topics. For example, climate change can affect biodiversity, water resources, flooding and landscapes. Table 4-3 shows the linkages to the updated AoS Objectives set out in the updated AoS Framework (Table 4-4).

In addition, Table 4-3 below identifies the likely evolution of each key sustainability issue, if the updated NPSs were not to be designated. This addresses the SEA Regulations requirement to describe ‘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).

It is to be noted that this table is a further iteration of key issues identified in the previous AoS of the Energy NPS. While there was a general update to reflect changes to baseline such as population figures, updates to this table were also made to reflect the review undertaken of updated PPPs, consultation responses and further assessment work. Key areas of change relate to biodiversity, such as additional information on targets, additional clarity on biodiversity net gain / net biodiversity benefit, a bigger focus on the marine environment, as well as changes to greenhouse gas emissions to better reflect the declaration of a climate emergency and the role of negative emissions technology. Other key elements include additional recognition of the need for climate resilience, as well as a greater recognition of decline in water resources / water availability, including in drought conditions. Additional note is made of groundwater and also has been made of designations such as Source Protection Zones and Marine Protected Areas.

Table 4-3: Key issues

Key issue and summary of baseline situation/information	Summary of likely evolution of the baseline without energy NPS (direction of condition trend)	Implications and Opportunities for the Energy National Policy Statement	AoS Objective
Biodiversity – new development and climate change put pressure on sites designated for nature conservation and wider green infrastructure[5], but wider green infrastructure can benefit from opportunities to deliver Biodiversity Net Gain through new development Across England and Wales, there are sites internationally (SACs, SPAs, Ramsar sites) and nationally (SSSIs) designated for nature conservation. SACs, SPAs, Ramsar sites and SSSIs are afforded the highest level of protection through statutory designations.	**Declining** Although designated sites are afforded protection; however, this is unlikely to prevent some decline in condition due to the combined effects of climate change and increased development. Much of the green infrastructure network is not designated, however, the absence of the strategic guidance of the NPS	The NPS should aim to protect and enhance all sites of biodiversity importance and place a particular emphasis on protecting sites designated for nature conservation. This could be achieved by ensuring that planning / design of new Energy developments and their associated infrastructure avoid sensitive areas and through the adoption of best practice wildlife friendly designs that deliver multi-functional green infrastructure. Where this is not possible, there should be mitigation and compensation for losses. In parallel with the AoS of the NPS, HRA is being undertaken which will identify the internationally designated	Enhance biodiversity and ecological networks, deliver biodiversity net gain and protect and support ecosystem resilience and functionality Protect and enhance sites designated for their international importance for nature conservation purposes *(linked to separate HRA process for Energy NPS)*

[5] Green Infrastructure is defined by Natural England as "a network of natural spaces designed to deliver benefits for people and the planet. This includes more good quality parks and greenspaces, more connected green routes and corridors like footpaths, cycle lanes, rivers and canals, more nature in towns and cities like wildflower meadows, street trees ponds and green roofs." This can include blue infrastructure elements which refer to water-based elements, such as rivers and ponds.

Within England there are a total of 82 SPAs, while Wales has a total of 17. There are also 242 SACs in England and 85 in Wales. Note also that Scotland also has numerous sites designated for nature conservation and there is a potential, in some circumstances, for these to be affected by proposals in the NPS. Across the whole of the UK, there is an extensive network of priority species and their habitats including those that were identified as being the most threatened and requiring conservation action under the 2024 UK Biodiversity Framework. Lists of priority species have been drawn up (and are updated) in respect of each of the UK's constituent countries. Many of these species are mobile / migratory. In addition, there are many of Invasive Non-Native species (approx. 3,000 across the UK) which can pose a threat to native species. A number of SPAs and SACs protect habitat and/or species associated with the marine environment. Currently, there are 46 SPAs with marine components designated partly or wholly within	could lead further declines.	nature conservation areas, where possible establish the likelihood of impacts on the integrity of these sites and identify appropriate avoidance and mitigation measures early in the development of the NPS. The NPS should afford protection to priority species and their habitats. The NPS should explore opportunities for new habitat creation and enhancement associated with energy developments, e.g. through the use of appropriate locally native species in landscaping plans. The potential for biodiversity creation in brownfield sites should be also taken into account. It is the intention of government to incorporate biodiversity net gain (BNG) requirements for all (terrestrial) NSIP projects and develop an approach for marine net gain (MNG). Other opportunities for the NPS include the following: • avoid the fragmentation of green infrastructure, by seeking the integration and enhancement of the green	

English waters and 10 within Welsh waters. A total of 3 SPAs with marine components are located within both English and Welsh waters. There are also currently 37 SACs with marine components designated partly or wholly within English waters and 12 designated partly or wholly within Welsh waters. A further 3 SACs with marine components are located within both English and Welsh waters. There are 73 Ramsar sites in England, totalling an area of 320,648 ha, while Wales has 7 Ramsar sites, totalling 11,366ha. In addition to these internationally designated sites, there are over 4000 SSSIs within England and over 1000 in Wales. There are also 91 MCZs designated in English waters and 1 in Welsh waters. Note that MCZs can also include those areas designated as Highly Protected Marine Areas (HPMAs), which while aligned with the same area, have different conservation objectives. In Scotland, the MPA network in territorial		infrastructure network to contribute to protecting natural habitats and delivering biodiversity net gain (Net Biodiversity Benefit in Wales) through all new developments; • the need for cohesive habitat networks to help habitats and species adapt to the consequences of climate change; • enhancement of the green infrastructure. Increased accessibility to appropriately designed multi-functional green infrastructure can play a significant role in diverting pressure away from more sensitive sites or areas. The NPS should incorporate measures designed to support the adaptation of biodiversity to the effects of climate change. The NPS should also integrate with Local Nature Recovery Strategies or Nature Recovery Networks. The NPS should note the Diversity, Extent, Condition, Connectivity and	

and offshore waters consists of 247 sites, 233 of these are for nature conservation purposes. The entire network is made up of 65 SSSI; 58 SAC; 58 SPA; 36 Nature Conservation MPAs; 16 RAMSAR sites; 1 Demonstration and Research MPA, 8 Historic MPAs and 5 other area based measures (which protect species such as sandeels and blue ling, as well as vulnerable marine ecosystems). There are substantial numbers of NNR and LNR recorded across England and Wales. There are also numerous areas of Ancient Woodland and priority habitats, together with Sites of Nature Conservation Interest (SNCIs) and locally designated wildlife corridor sites. Although these areas are not afforded the highest statutory protection, they contribute significantly towards nature conservation. All sites, from those designated with the very highest level of protection, to those areas at the local level, are threatened by a range of issues such as habitat loss, human encroachment, poor management practices and invasive species. Changes in air and water		Aspects of ecosystem resilience (DECCA) framework for evaluating ecosystems resilience based on the attributes of diversity, extent, condition, connectivity and adaptability. The NPS should also set out how Biodiversity Net Gain / Biodiversity Net Benefit can be demonstrated on a project.	

quality along with a changing climate can also change distribution of species and habitats within these sites. Increased accessibility or proximity of development to designated sites also has the potential to adversely affect them indirectly, for example through disturbance or pollution deposition. There is extensive priority habitat coverage across England with 1.86 million hectares across terrestrial and coastal priority habitats. There are 27 main habitat types in comparison to Wales where there are 20 across terrestrial and marine habitats. The wider green infrastructure network across England and Wales incorporates not only sites designated for nature conservation purposes, but also many other multi-functional green spaces and the connections between such locations. This network is highly susceptible to impacts from development including: • direct land take (which may contribute to fragmentation)			

• construction and operational disturbance (noise, vibration, light pollution, etc.) • emissions / contamination (air, water and soil). There are also potential risks associated with blue infrastructure across this region, which includes rivers, streams and other waterbodies. Potential impacts include (but are not limited to) changes in water flows and levels, particularly from water abstraction. In addition, the importance of impacts at a landscape scale must be recognised, including considering fragmentation and isolation when identifying potential impacts on habitats and species. This is particularly relevant to the potential for large land requirements from large scale new energy development (such as nuclear and solar farms), particularly during construction and in delivering related infrastructure. In the marine environment, birds, mammals, fish, pelagic habitats and benthic habitats are affected by impacts such as:			

• extraction of, or mortality/injury to, wild species (by commercial fish and shellfish harvesting and recreational fishing and other activities) • changes to hydrological conditions • anthropogenic sound • input of other forms of energy (including electromagnetic fields, light and heat) • physical loss of benthic habitats (due to permanent change of seabed substrate or morphology and to extraction of seabed substrate). In recognition of the continued threats and alarming levels of biodiversity decline, there are a range of commitments made through Strategies, Policy and Action Plans at the International, National and Local levels to halt biodiversity loss and reverse those losses made to date – this has resulted in the need for new development to deliver Biodiversity Net Gain (BNG) in England, with a minimum 10% set out in the Environment Act 2021. Currently BNG targets only apply			

to terrestrial and intertidal components of new development granted planning permission under the Town and Country Planning Act 1990. The Environment Act 2021 also includes provisions to introduce a biodiversity net gain requirement for NSIPs. Principles for Marine Net Gain are currently in development by Defra who will provide further guidance in due course. Note that Planning Policy in Wales promotes Biodiversity Net Benefit. Three statutory long-term targets have been set in 2022: • to reduce the risk of species' extinction by 2042, when compared to the risk of species' extinction in 2022. • at least 70% of protected features in MPAs to be in a favourable condition by 31 December 2042, with the remaining features to be in a recovering condition. • by the end of 31st December 2050 at least 16.5% of all land in England is covered by woodland and trees outside woodland.			

Geodiversity - new development puts pressure on designated geodiversity sites In addition to the three Geoparks designated within England and two in Wales, there are a number of areas designated as SSSI due to having geodiversity, or geodiversity combined with biodiversity importance. These areas are in a mix of conditions, with both favourable and unfavourable occurring. There are also some of the areas in decline, while others are recovering. Some SSSIs are also part of active quarry sites, which presents a potential link between new development and the need for further quarried resource for development. There are also a range of Regionally Important Geology Sites (RIGS) and Local Geological Sites across England and Wales. Geology across England and Wales is likely to face threats from new development; human activities such as pollution, roads, disturbance, farming practices; changes to shoreline	**Declining** While some of the geodiversity resource is in favourable condition, some is not and all aspects are experiencing threats from development, as well as the need to adapt to climate change. In the absence of the NPS, there is heightened potential for inappropriate greenfield development.	A co-ordinated strategic approach to development and infrastructure is required to limit the potential for inappropriate greenfield development to occur. This will help to manage pressures on SSSIs designated for their geological importance and on RIGS. The NPS presents an opportunity to develop strategic principles designed to control pollution, promote the re-use of previously developed land and tackle some of the causes of climate change, all of which should help to afford protection to the geodiversity resource.	Protect, enhance and promote geodiversity

management, loss of habitat; and a changing climate			
Greenhouse gas emissions – there is an urgent need to further reduce emissions from the energy sector and reduce energy demand The release into the atmosphere of greenhouse gases (e.g. CO2, CH4, N2O, O3) resulting from fossil fuel usage, agriculture, land use change and other human activities has been linked with atmospheric warming and global climate change. The United Kingdom has achieved significant cuts to emissions in recent years. Total emissions of direct greenhouse gases have decreased by 50.0% between 1990 and 2022 and 3.5% between 2021 and 2022. This decline between 1990 and 2022 is driven predominantly by a decrease in emissions from the energy supply sector – particularly from power stations. CO2 is the largest contributor to global warming in the UK. As of 2022, CO2 emissions were estimated to be 406.2. Mt CO2 equivalent, 50.0% below the	**Declining** Interventions at the local and regional level have started to reduce the rate of greenhouse gas emissions; and actions outside the NPS are contributing to decarbonisation of energy networks. However, the underlying trend points towards a slowing of emissions rather than reversal of trends.	The NPS should ensure that reducing CO2 emissions and achieving Net Zero carbon is a core component of all development ambitions. There is also a need to seek to minimise energy demand from households, transport and businesses in anticipation of growing pressure on the future supply of electricity as decarbonisation continues across all sectors. The NPS should also ensure that opportunities are taken for maximising tree cover, where practical. Amongst other benefits, careful species selection and placement in the right location can contribute to carbon sequestration by absorbing increased amounts of CO2 from the atmosphere. Depending on the site, other approaches including peat restoration could also contribute to carbon sequestration. There is an opportunity for the NPS to coordinate the proposed strategic	Consistent with the national target of reducing carbon emissions to Net Zero by 2050

1990 level. CH4 is the second most significant greenhouse gas in the UK after CO2 and since 1990, emissions of CH4 have decreased by 62.5%. As of 2022, methane emissions were 56.4 Mt CO2 equivalent. As of 2022, emissions of N2O were 18.1 MtCO2 equivalent. Emissions of N2O have declined 58.8% since 1990. Emissions of the F-gases (HFCs, PFCs, SF6 and NF3) totalled 7.6 Mt CO2 equivalent in 2022. Since 1990 the overall decrease in their emissions has been 48.6%. [6] Efforts in relation to addressing climate change have been bolstered by a declaration of a Climate Emergency and this has resulted in commitments (made in January 2025 under the UK's Nationally Determined Contribution communication to the UNFCCC7) to reducing all greenhouse gas emissions by at least 81% by 2035, compared to 1990 levels and to bring all greenhouse gas emissions to net zero by 2050.		energy development locations with sustainable infrastructure connections.	

[6] UK Government (2024) Final UK greenhouse gas emissions national statistics 1990-2022 – Territorial greenhouse gas emissions by gas. Available: final-greenhouse-gas-emissions-tables-2022.xlsx
[7] UNFCCC is the United Nations Framework Convention on Climate Change

Under the UK Climate Change Act 2008, the UK has so far set six 'carbon budgets', with recommendations made in February 2025 by The Committee for Climate Change for the Seventh Carbon Budget, to limit the UK's greenhouse gas emissions over the five-year period 2038 to 2042, to 535 MtCO2e, including emissions from international aviation and shipping. The sixth carbon budget for 2033-2037 would require a 78% reduction and the seventh budget for 2038-2042 a reduction of 87%. It is reported that emissions reductions will need to outperform the fourth carbon budget to be on a path to achieve the UK's 2030 Nationally Determined Contribution (NDC), the Sixth Carbon Budget and Net Zero. The UK Net Zero Strategy sets out that the exact technology and energy mix in 2050 cannot be known now, and the path to net zero will respond to the innovation and adoption of new technologies over time. However, it is expected to rely, among other technologies, on electricity from low carbon generation and storage technologies to meet higher demand for			

low carbon power in buildings, industry, transport, and agriculture. Negative emissions technologies (NET) for the absorption and storage of CO2 and other atmospheric GHG will also play a role in meeting net zero. These include Bio-Energy with Carbon Capture and Storage (BECCS), which combines biomass with carbon capture and storage; and Direct Air Carbon Capture and Sequestration (DACCS), which can use chemicals to capture CO2 from the air; and newly emerging NETs focusing on ocean based carbon capture. Alongside NETs, Nature Based Solutions (NBS) on land such as protecting and restoring forests and wetlands are also a means to achieve negative emissions by biological sequestration. Compared to technology-based solutions to climate challenges, NBS are often more cost-effective, longer lasting, and have multiple synergistic benefits including: reducing net emissions, expanding carbon sinks; providing habitats for biodiversity, benefiting human health and well-being, helping our society and economy adapt to climate change, and making more			

resilient and nicer places to live and work			
Adaptation to a changing climate – England and Wales are already seeing the impact of climate change through increased severe weather events, leading to flooding, heat waves and hotter summers. The extent of the effects of climate change will vary by location and projections indicate that climate change trends observed over the last century will continue and intensify over the coming decades. **There is a need for development to be climate change resilient** The UK's Climate Projections show that the UK as a whole is likely to continue to experience hotter, drier summers, warmer, wetter winters and rising sea levels. This is likely to have a significant effect on a range of environmental conditions, including the water environment / water resources and there is an urgent need to develop climate resilience. Along with an increase in extreme weather events, it is anticipated that a	**Declining** Climate change is recognised as a global concern with England and Wales, as with the rest of the UK, anticipated to experience hotter, drier summers; warmer, wetter winters; and rising sea levels. These trends are anticipated to continue irrespective of interventions from outside the NPS.	The NPS needs to be realistic and recognise that changes in temperature and rainfall patterns, along with more frequent extreme weather events, creates the situation where a greater degree of resilience will have to be incorporated into plans and proposals. Recognition also needs to be made of health implications from a changing climate and the NPS can drive a strategic response to health stressors associated with climate change. There are multiple benefits associated with tree planting, including climate change adaptations. Strategic policies present the opportunity to promote this as a means of delivering urban cooling, wildlife benefits, contributing to flood reduction and supporting carbon sequestration. There are also benefits to wider Nature Based Solutions, such as Natural Flood Management and blue infrastructure. Green infrastructure specifically can contribute to climate change adaption through carbon	Maximise adaptation and resilience of built assets, communities and people as well as natural assets, habitats and species, to the multiple effects of climate change Enhance biodiversity and ecological networks, deliver biodiversity net gain, protect and support ecosystem resilience and functionality

changing climate will lead to an increase in risk to people and place. These increased risks include risks to health and well-being from increase in extremes of temperatures; risk to people, communities and buildings from flooding; risk to viability of coastal communities from sea level rise; risk to health and social care delivery from extreme weather and risk to health from changes in air quality, as well as risks to people and the economy from climate-related failure of the power system. A changing climate is likely to result in increased frequency and intensity of severe weather events. At present, significant proportions of the UK population are at risk from flooding, although the degree of risk varies, with a range of factors affecting potential risk. Increased flooding and increased flood risk are recognised as being some of the main potential threats from a changing climate due to potential direct risk to properties and infrastructure, as well as potential direct risk to human life and indirect risk to mental wellbeing. In addition, extreme weather events could include increased risk of higher summer temperatures (with direct impacts on		storage, cooling and shading, opportunities for species migration to more suitable habitats and the protection of water quality and other natural resources. It can also be an integral part of multifunctional sustainable drainage and natural flood risk management. The NPS should recognise the challenges that a changing climate will bring and aim to reduce the impacts. More frequent and extreme weather events should be considered in any design – this would include potential risks posed by increased heat, or more intense cold. The NPS should seek to ensure that new development minimises any negative effects arising from flooding and avoids where possible areas of highest flood risk. Flood risk should be considered in any design and the implementation of multi functional green infrastructure including SuDS and other similar appropriate measures or new approaches should be considered and encouraged where feasible. This should include Natural Flood Management and other means	

water resources / water availability), or severe cold spells. Across England and Wales, areas of potential flood risk from both rivers and coastal sources have been identified and are noted in a series of flood hazard maps and flood management plans. Flood Zones 2 and 3 are located across England and Wales. Very significant numbers of properties are currently at flood risk – for example, in England alone this is in excess of 5.2 million properties. A changing climate also presents risks to the natural environment and the services it provides. The viability and diversity of terrestrial, freshwater and marine habitats and species are being affected from multiple climate hazards. For example, coastal squeeze due to sea level rise, coastal flooding and erosion leading to coastal habitat loss, and changes in the distribution of species, and arrival of new species including invasive species, due to changes in climate; and natural carbon stores and sequestration being affected by multiple climate hazards, for example		of increasing flood storage capacity. The NPS should seek to explore the possibilities for creating blue infrastructure which can both help to manage localised flood risk and simultaneously create new habitats. Climate change could also reduce water resources / quantity of water available for energy infrastructure projects. This may also lead to an increased requirement for water efficiency measures. Reduced flows in water courses / amounts in water bodies could also have implications for discharges to the water environment.	

loss or degradation of peatland due to extreme drought. Soil health is affected from increased flooding and drought which compromises soil functions (note that this is further considered under the Soil topic).			
Air Quality – the United Kingdom experiences pockets of poor air quality, principally derived from concentrations of urban and industrial activity, major road infrastructure and congestion Air pollution affects public health, the natural environment and the economy. Air quality has improved in the UK over the last sixty years as a result of the switch from coal to gas and electricity for heating of domestic and industrial premises, stricter controls on industrial emissions, higher standards for the composition of fuel and tighter regulations on emissions from motor vehicles. However, poor air quality – particularly from motor vehicles – remains a significant issue for community health and for biodiversity,	**Improving** At the national level air quality is generally improving as industrial practices, energy sources and tighter environmental legislation have contributed to reductions in pollutants. However, parts of England and Wales experience localised pockets of poor air quality – interventions outside the NPS will seek to address some of these issues, but opportunities exist for	The NPS should aim to protect and enhance air quality and should seek to ensure that reducing NO2, PM2.5 and PM10 emissions is a fundamental principle. The NPS should aim to ensure that no AQMA is worsened, or proposed development does not lead to changes, particularly increases, in traffic / transport that could lead to the declaration of further AQMA. The NPS should aim to exceed Government targets for air quality and be reflective of appropriate legislation, particularly seeking to deliver health benefits from improved air quality, as well as considering ecological receptors.	Protect and enhance air quality on a local, regional, national and international scale Improve health and well-being and safety for all citizens and reduce inequalities in health

especially in/downwind of urban areas and major transport networks. It is also to be noted that the use of solid fuels (including for 'lifestyle' fuel such as wood burners in homes) are recognised as being a major contributor to poor air quality in towns, particularly during winter months. Nevertheless, poor air quality is generally associated with urban/industrial areas and major road infrastructure and this is reflected in the typical location for Air Quality Management Areas (AQMA), many of which have been designated due to high NO2 and PM10 levels. Across England, there are a total of 532 AQMA, while within Wales there were 44, all principally in those areas of greatest population, or areas of particular road congestion and these have impacts both on human health and biodiversity. Approximately 85% of Sites of Special Scientific Interest (SSSI's) in England have nitrogen deposition rates above levels at which harm is expected (environmental thresholds), these exceedances will influence the ability of protected sites to reach favourable	the NPS to influence this issue.		

conservation status / favourable condition. An estimated 95% of nitrogen sensitive habitat is thought to be exceeding its critical load. Nitrogen emissions have been identified as a significant pressure or threat to 62% of England's International (European) protected sites. The Environment Act 2021 stipulates air quality (PM2.5) as priority quality long term target.			
Water environment –pollutants from a range of sectors including energy pose considerable risks to the quality of water across England and Wales. Additional water demand from energy development would likely put further pressure on water resources. There are considerable pressures on water resources with resulting major impacts on many of the waterbodies across the UK. For the purposes of taking a holistic approach to management of water resources and to address the pressures on the water environment, under the Water Framework Directive (WFD), the UK has	**Stable / Improving** Surface water quality is predicted to remain stable; however, ongoing pressures remain and climate change may compromise improvements. In relation to water demand, it is predicted the trend will be a decline in resource, as pressures such as abstraction are set to	The NPS should seek to prevent pollution of water bodies (including groundwater and bathing water) both during the construction and operation of any proposed energy development. This could be achieved via the appropriate use of SuDS, green infrastructure or other appropriate measures and new approaches in infrastructure drainage design to enhance water quality and reduce pollution and flood risk. Risk to all types of water bodies (not just main rivers) is to be considered during any development design. Recognition of the objectives of the WFD should be made and all	Protect and enhance the water environment Enhance biodiversity and ecological networks, deliver biodiversity net gain, protect and support ecosystem resilience and functionality

been divided into a series of River Basin Districts (RBD). As with most water bodies in England, there are a range of significant water management issues manifested across RBD, with pollution from infrastructure being of note. It is worth noting that not a single river in England has received a 'clean bill of health' in terms of chemical contamination8 Groundwater is also an important element of the water environment and can be vulnerable to pressures from energy infrastructure, for example through abstraction or through discharges (controlled or uncontrolled). Many groundwater bodies are not expected to achieve good status for in excess of 20 years (if at all). There are also a series of Drinking Water Safeguard Zone (DWSZ) across England and Wales (which are areas where additional measures are needed to improve water quality), as well as Source Protection Zones (SPZ) which are used to define areas close to	continue and increase in many areas.	opportunities to help meet the objectives of the WFD should be taken when possible. Water availability (including in drought conditions and water efficiency) and management should also be considered by the NPS.	

[8] House of Commons Environmental Audit Committee – Water Quality in Rivers Fourth Report of Session 2021-22

drinking water sources where the risk associated with ground water contamination is greatest) and designated bathing waters. The number of waterbodies assessed each year varies and has decreased from 10,761 in 2009 to 9,300 in 2018. There was a small decrease in the overall number of water bodies awarded high or good surface water status between 2009 and 2018. In 2018, 35% of surface water bodies assessed under the WFD in the UK were in high or good status. This reflects very little change from 36% of surface water bodies assessed in 2009 and 37% in 2013. It is anticipated that overall water quality will improve as the UK aims to ensure that the objectives of the WFD (all aquatic ecosystems and terrestrial ecosystems and wetlands to reach good chemical and ecological status by 2027). Climate change and a growing population will increase pressure on water resources. There is also a network of Marine Protected Areas (which complement and are aligned to wider designations			

such as SAC and SPA) around the UK, with 178 MPAs in English waters covering 51% of inshore and 37% of offshore waters. Protecting MPA species and habitats will contribute to healthier marine ecosystems, and the maintenance and restoration of valuable ecosystem services. In addition, the first 3 Highly Protected Marine Areas were designated in June 2023. These are designated to protect the marine ecosystem of the area (including all marine flora and fauna, all marine habitats and all geological or geomorphological interests, including all abiotic elements and supporting ecosystem functions and processes, in the seabed, water column and the sea surface). The Marine Strategy Regulations 2010 marked a significant step forward in the protection and management of the UK's coastal waters through requiring actions to be taken to achieve Good Environmental Status (GES). As at 2019, the UK has largely achieved its aim of GES for contaminants. Concentrations of hazardous substances in the Celtic Seas and the Greater North Sea and their biological			

effects are generally meeting agreed target thresholds which means they are at levels that should not cause harm to sea life (89% for contaminant concentrations and 96% for biological effects). The few failures are caused by highly persistent legacy chemicals such as PCBs in biota and marine sediments mainly in coastal waters and often close to polluted sources.			
Soil and Contaminated Land – soil is a non-renewable resource and is vulnerable to erosion, degradation and contamination. In addition, historic land uses have contributed to contamination across large areas. There is a need to address this in order to enable beneficial re-use of previously developed land and help protect soil resources from pressure for greenfield development Soil across England and Wales is graded, with those considered Best and Most Versatile (BMV) being noted as Grade 1, 2 and 3a. BMV soils are under pressure in many areas from development in order to support market led growth aspirations. Soil sealing (the covering of the soil surface with	**Declining** It is likely that greenfield sites will experience increasing pressure for development in preference to the complexities of redeveloping previously developed and potentially contaminated sites. This could reduce available high quality soil resources and fail to realise the potential of existing capacity within existing urban	The NPS should seek to make best use of areas that are already urbanised (or subject to energy / industrial uses) and provide an opportunity for regeneration / improvements to land quality. Measures should be taken to avoid those areas of the highest quality agricultural soils and aim to protect soil and agricultural holdings through avoidance of impacts such as contamination or severance. There are also opportunities for improved soil management, as all soils store carbon, the amount largely depending on soil type and management. The NPS must protect soils as they are essential natural capital and	Protect soil resources, promote use of brownfield land and avoid land contamination

impervious material or the changing of its nature so that it becomes impermeable) is associated with development and is a primary cause of soil loss. The development of greenfield sites can lead to loss to valuable agricultural land which generally cannot be mitigated. Contaminated Land is legally defined as where substances are causing or could cause significant harm to people, property or protected species, significant pollution of surface waters or ground waters. Determination of contaminated land is made in the UK by a local council or the relevant environment agency. Many areas of land in the UK have also been contaminated by past industrial and other human activities, including former factories, storage depots and landfills. Energy related infrastructure is also a frequent source of land contamination. Land at the full range of potentially contaminated sites could be contaminated by a wide range of harmful substances such as oils and tars, heavy metals, asbestos and chemicals.	and previously developed areas.	perform a range of important ecosystem services and functions. Dealing with the past pollution / contamination legacy is a major issue and should be addressed at all opportunities due to its ongoing environmental impact. Remediation of land / soil can benefit other environmental topics such as the water environment but note that land remediation also needs to be resilient to a changing climate.	

While many areas of contaminated land, including special sites of contamination determined under the Regulations, or those known by Local Authorities have been identified, by its nature, it is often very difficult to know where land has been contaminated previously or is currently suffering ongoing contamination. As such the number of known sites of contamination is likely to be only a very small fraction of the overall number of potentially contaminated sites. Given the present and historic levels of industrial, commercial and transportation activity across England and Wales, in addition to the high levels of urbanisation, it is suggested that the number of areas of contaminated land could be considerable.			
Cultural Heritage – there is a substantial cultural heritage resource across England and Wales; however, there is considerable variation in the condition and integrity of assets. There is a need for a strategic perspective that promotes contextual understanding and supports	**Stable/Declining** Designated heritage assets benefit from protection that will continue without the NPS. However, in the absence of a strategic plan there is a greater risk of uncoordinated	New energy related development may result in pressure on areas of importance for their cultural heritage and aesthetic quality. There is a requirement for development proposals to be carefully considered such that assets are preserved and enhanced – the NPS will need to respond to context such that preservation is pursued where	Protect and enhance cultural heritage assets and their settings, and the wider historic environment.

regeneration where this contributes to conservation and enhancement Those cultural heritage assets of the greatest recognition in England and Wales are the 22 World Heritage Sites. These sites are recognised as having Outstanding Universal Value and the management plans note that this is to be understood, protected and sustained. In addition, there is also a very large number of Scheduled Monuments across England and Wales (in excess of 24,000), including a large number which are at particular risk of being lost through neglect, decay or deterioration. Similarly, there is a very significant number of listed buildings across England and Wales (over 400,000) and many of these are at particular risk of being lost through neglect, decay or deterioration. Likewise, Conservation Areas are under increasing pressure from development, neglect, decay or deterioration. In addition, Areas of Ancient Woodland, i.e. those areas that have been continuously wooded since at least 1600AD are scattered across England	and piecemeal energy development resulting in contributing to the successive erosion of the quantum and integrity of the nation's cultural heritage resource.	appropriate, but pro-active management and redevelopment can be supported where this secures viable futures for cultural heritage resources that are currently threatened. Additional energy related development may be inappropriately located or designated to pose a risk to the cultural heritage assets as well as their setting. Without a co-ordinated strategic approach to development and infrastructure there is an increased potential for this risk to result. As well as those sites of the very highest value such as World Heritage Sites, similar potential impacts can be identified in respect of the range of scheduled monuments, Listed Buildings, Conservation Areas and locally listed cultural heritage assets. It is important to note that the nature of cultural heritage features means that not all are known at present; in particular, buried archaeological remains. As such, any energy related development should be as sensitively	

and Wales. These areas have a significant contribution to the cultural heritage of an area and are also of importance to biodiversity and landscape. Beyond these assets, there are also a large number of registered parks and gardens across the UK which are of historic importance. Of course, by its nature, there are also a number of undesignated assets or unknown archaeological remains which could have national regional or local value. The importance of the protection of the historic environment is increasingly being recognised at a national and regional level, with the loss of heritage resources being difficult to mitigate. Development affects the historic environment through loss, damage or changes to setting for instance from visual intrusion, increased traffic, noise, or air pollution.		designed as possible to recognise and be sympathetic to the existing cultural character and quality and opportunities for improving settings should be examined.	
Landscapes, Waterscapes & Townscapes – there are marked contrasts in the quality, character and distinctiveness of landscapes and townscapes across England and	**Improving** Many of the most exceptional landscape and townscapes	The NPS should seek to preserve and enhance the character of the wider landscape and townscape by ensuring that its integrity and valuable natural open space is not lost. Particular	Protect and enhance the character and quality of the landscapes, townscapes and waterscapes and protect

Wales. There is a need to fully protect the highest quality locations, whilst driving best practice principles through all energy development to address poor landscape and townscape environments. There are a total of 13 National Parks within England and Wales. There are also 46 National Landscapes (formerly known as AONB's) in England and 5 within Wales. In addition, there are a total of 46 Heritage Coasts around both England and Wales. Landscape characteristics are assessed across the UK through several methods, including sub-division of England into Landscape Character Areas and use of the LANDMAP tool in Wales. There are also significant areas designated as Green Belt, with "*a fundamental aim to prevent urban sprawl by keeping land permanently open. This designation serves five main purposes of checking unrestricted sprawl in large built up areas; prevents neighbouring towns from merging; assists safeguarding the countryside from encroachment; preserves the*	benefit from protection through designations that will persist in the absence of the NPS. In general terms, modern design principles are promoting a renewed focus on the quality of design and this trend is likely to continue; however, without the NPS it may lack strategic focus and direction, resulting in variable quality and some pressure on greenfield land.	attention to be paid to those areas designated for their landscape value, such as National Parks (formerly known as AONBs). Opportunities for landscape enhancement should be explored, e.g. through sympathetic design and enhancements to existing landscape improvement areas, as well as new planting opportunities associated with new energy development and be in keeping with the aims of the Nature Recovery Network. The location of planting will need to be considered with regard to the proposed aims of landscape restoration in the local area. Any particular solution to a landscape problem such as additional tree planting should be the right solution for that particular area. Increased energy development poses a serious risk to tranquillity through increased disturbance (including light and noise) and visitors. As such, there is a need to protect the special quality of those areas of relative tranquillity of many parts of England and Wales. Without a co-ordinated strategic approach to development and	and enhance visual amenity.

setting and special character of historic towns and assists in regeneration , by encouraging the recycling of derelict and other urban land".[9] While there are areas of great beauty and tranquillity across England and Wales, it is also important to recognise that there are significant parts that are characterised by urban development, major infrastructure and other noise and visual intrusion (including light pollution). This is largely associated with (but not confined to) the main urban areas. Loss of tranquility and loss of dark skies are increasingly being recognised as important issues. Nevertheless, there exists across England and Wales, significant elements of green infrastructure that includes for example, parks, open spaces, playing fields, woodlands and private gardens, as well as agricultural and upland areas. This, alongside 'blue infrastructure' of rivers, canals, streams and other water bodies can act in a multi-functional way across a range of issues by supporting, for example,		infrastructure degradation of the special qualities of the most special areas such as National Landscapes (formerly known as AONBs) may result. The NPS should also aim to ensure that energy developments and associated infrastructure avoid sensitive areas and respect particular landscape or townscape settings. Careful consideration should be given to design quality in both an urban and rural setting, promoting placemaking principles and seeking to inject character and distinctiveness where possible and where this enhances the sense of place. Design, where possible, should respond positively to the local characteristics, including vernacular architecture when appropriate. Without a co-ordinated strategic approach to development and infrastructure, there is increased potential for planning decisions to lead to inappropriate development, which could fragment existing networks of	

[9] National Planning Policy Framework (2019), Paragraphs 133 to 134

biodiversity, carbon storage, natural drainage and flood storage and health and wellbeing. However, increased urbanisation and general development has acted to erode the connectivity of this green and blue infrastructure, resulting in a decrease in its integrity. The townscapes across England and Wales includes substantial cultural heritage assets. There are many areas benefitting from associated designations, which include World Heritage Sites, Conservation Areas and local listings (refer to the cultural heritage key issue description). In many areas, 20th and 21st century redevelopment and regeneration have introduced a juxtaposition of modern architecture with historic fabric, delivering distinctiveness within the townscape. However, there are also areas where the quality and integrity of townscape has been eroded by successive and often piecemeal regeneration activities and there is a need to promote enhanced design through all energy development proposals.		open space thereby reducing connectivity.	

Economic activity, opportunity and deprivation – there are marked spatial contrasts in economic activity and GVA by job across England and Wales and the challenge is to achieve more equitable access to opportunity as a means of tackling deprivation. The economy across the UK has been subject to challenging conditions over the last number of years due to impacts from COVID-19 and 'Brexit'. Main points from the ONS note that UK gross domestic product (GDP) is estimated to have increased by 0.1% in Quarter 3 (July to Sept) 2024, following a growth of 0.5% in Quarter 2 (Apr to June) 2024. GDP in the UK is estimated to have increased by 1.0% in Quarter 3 2024, compared with Quarter 3 of 2023. Overall output in the production industries decreased in 2024 from 2023 by 1.7%, following on from a decrease of 0.9% in 2023 from 2022. It is estimated that services output increased by 0.1% in November 2024, following no growth (0.0%) in	I**mproving** The headline statistics generally show an upward trend in employment and GVA by job; and a falling trend in unemployment. However, there are clear spatial disparities between the value of jobs, which can be a proxy for the quality of job opportunities available.	Without the strategic approach to energy development the required development and associated infrastructure is less likely to be provided to encourage investment in areas where highest numbers of residents can benefit from new employment opportunities. The NPS also offers the opportunity to help shape the spatial distribution of employment generation helping to overcome some traditional barriers to opportunities, such as accessibility. The pattern of deprivation across England and Wales is geographically complex, incorporating stark contrasts between wealthy and severely deprived communities. Without the strategic approach to energy development, opportunities to deliver development and infrastructure which can improve equitable and inclusive access to employment and the increasing of income of local people are less likely to be achieved.	To promote a strong economy with opportunities for local communities

September 2024 and a decrease of 0.1% in October 2024. Monthly construction output is estimated to have grown by 0.4% in volume terms in November 2024, this follows a revised decrease of 0.3% in October 2024. There has been an increase from 2023 to 2024 in private consumption. UK government consumption levels have increased from 2023 Q4 to 2024 Q4. and business investment in Quarter 2 2024 has increased from Quarter 2 in 2023. The UK's GDP levels has recovered to pre-Covid levels, with GDP with a 2.9% increase from the end of 2019 to the beginning of 2024. As of August 2024, the unemployment rate in England was 4.4%, while it was 5.3%in Wales. Economic activity in the same period was 78.8% in England and 74.1% in Wales. These issues will undoubtedly play a major role in deprivation and economic outcomes for all parts of England and Wales, with those areas of current deprivation most likely to have the worst			

economic recovery and future outcome. The Indices of Multiple Deprivation show that the majority of the most deprived areas in the UK are located within urban centres of population. The south east, south west and east of England are the least deprived areas in the UK. Deprivation increases in urban areas, with towns and cities generally being more deprived that rural areas. The north west and north east are the most deprived areas of England. Middlesbrough, Knowsley, Kingston upon Hull, Liverpool and Manchester are the five local authority districts with the largest proportions of highly deprived neighbourhoods in England. The south east and north east coast are the most deprived areas in Wales. Deprivation is most concentrated in the south east, around the urban areas of Cardiff, Newport, Swansea and Bridgend. The smaller towns within the valleys of the south east, such as Caerphilly and Merthyr Tydfil are similarly deprived. Comparatively the rural areas of Wales are considerably less deprived.			

These areas have relatively lower income, less access to services, higher unemployment and increased crime rates. There has been little variance in the locations of the most deprived areas of the UK over the last 20 years, with certain areas being in a state of persistent deprivation. It is important to note that there are also pockets of deprivation surrounded by less deprived places in every region of England. These areas have relatively poorer health and well-being in comparison as those classed as less deprived.			
Population growth and demographics – England and Wales have a growing population, with a general underlying trend towards an ageing population, though there are areas with younger population profiles. These demographic characteristics contribute to a complex pattern of highly-contrasting communities, with differing requirements for economic and social infrastructure. The population estimate of England in mid-2023 was 57,690,323 which accounts for 84.5% of the UK's	**Increasing** Population growth is projected to continue to increase across the UK and the overall trend is towards an ageing population.	Both England and Wales (along with the UK as a whole) are expected to see population growth in the coming years, with the proportion of residents of an older age. This growth will be uneven across the country, with a focus on larger urban areas most likely in relation to population growth (though the move to home working induced by COVID-19 may have implications for smaller towns, villages and rural areas). Smaller villages and rural areas may experience an increasingly older demographic (as would less deprived areas), though again, the	To promote a strong economy with opportunities for local communities.

population. The population estimate of Wales in mid-2023 was 3,164,404 which accounts for 5% of the UK's population. In 2023, England and Wales had the least number of live births since 1977, and the total fertility rate dropped to 1.44, which is the lowest value recorded since records began in 1938, which has lead to a slowing rate of population growth. Despite birth rate dropping, the UK population is still growing and predicted to continue growing mainly due to a rapid increase in immigration from 2020 to 2023. It is also anticipated that the population profile will age, with the population over 65 in 2023 being 18.9%, that is projected to rise to 27% by 2072. Local authorities with the highest proportions of older people in the UK are most commonly found in coastal areas of southern and eastern England. The population of the UK is spread unevenly, with the population density ranging from 5,700 people per square kilometre across London to fewer than		implications of COVID-19 (such as through increased home working) are still unclear in this regard.	

50 people per square kilometre in the most rural local authorities of the UK. The south east of England, in particular London and the surrounding areas are highly populated. Large urban areas are located along the south coast, including Brighton, Southampton, Portsmouth and Bournemouth. The midlands and north west are also locations of large urban areas, including Birmingham, Leicester, Nottingham, Greater Manchester and Liverpool. The east, north east and south west of England contain fewer major settlements, however large urban areas are located in these regions, including Newcastle, Sunderland, Leeds and Bristol. The most populated area of Wales is the south coast, where the large urban areas of Cardiff, Newport, Bridgend and Swansea are located. The north coast has fewer major urban settlements, however areas of population are present in Rhyl, Colwyn Bay and Bangor. Central and western Wales have smaller towns and villages distributed throughout the regions.			

Communities: Supporting Physical Infrastructure – infrastructure investment is delivered by a range of providers across the United Kingdom and can often be reactive. Significant new infrastructure, or upgrades to existing infrastructure is planned across a range of sectors. The strategic rail network in England is well developed. All major cities are connected as are the majority of significant towns. Extensive rail networks are located around large conurbations such as London and Greater Manchester, with the major cities in the midlands being well connected. Remote, rural and coastal areas are less well served by rail. Both the north and south coast of Wales are well connected by rail, linking the major coastal cities such as Cardiff and Swansea in the south, and Llandudno, Bangor and Holyhead in the north. Few major branch lines extend from these links, and the central and western regions of Wales are comparatively poorly served by rail.	**Improving** There are various infrastructure investment plans and programmes being developed and implemented and these should continue to enhance the supporting transport, utilities and digital infrastructure to support growth levels.	There is a role for the NPS in promoting infrastructure provision in a co-ordinated and pro-active manner, delivering the means to catalyse, rather than react to demands for growth. The NPS should seek to ensure that energy development provides opportunities for utilisation of electric vehicles, as well as access to more sustainable transport modes.	Promote sustainable transport and minimise detrimental impacts on strategic transport network and disruption to basic services and infrastructure. To promote a strong economy with opportunities for local communities.

England is covered by a comprehensive network of motorways and A roads. All major cities are served by motorways, whilst towns and larger villages are connected by A routes. Areas not serviced by these connections are generally rural and in areas of low population. The south and north coast of Wales are the only areas with motorway connections. The remaining regions are serviced by the A road network which links the major towns and villages. Comparatively the central and upland regions are less provisioned with strategic network links. There is a well-established electricity generation and distribution network across both England and Wales, which is being increasingly utilised for an expanding EV charging network. As would be expected, greatest provision of electricity network capacity is to the more urbanised areas. This network is increasingly supplied by renewable sources. As would be expected, there is significant wastewater infrastructure			

across the area, though, as with other areas there are legacy and capacity issues with some elements. For example, many areas still have both a combined and separate sewer systems for collecting all wastewater and sewage and under heavy storm conditions, the sewer capacity can be exceeded. Consequently, these areas have above average risk for sewer incapacity and also has several frequent spilling storm overflows. Provision of gas networks is variable across the country. Across the UK, the areas with ultrafast broadband connectivity are mainly located in urban residential areas, though it should be noted that there are pockets within many urban areas where only standard broadband is available.			
Communities: Physical Health and mental wellbeing – in general terms there are significant differences in measures of good physical and mental health as well as life expectancy across England and	**Stable / Uncertain** While population levels are likely to continue to rise, there is uncertainty over migration levels due to	Indirectly, health and wellbeing levels could be improved through secondary effects of policies that help to create healthy environments. This involves the protection of existing and creation of new open spaces, contributing to a	Improve health and well-being and safety for all citizens and reduce inequalities in health.

Wales, many indicators reflecting the spatial distributions of economic activity and income, age, deprivation, race and similar - there is a need to tackle spatial inequalities in health regards. There is also a growing appreciation of the importance of supporting good mental health and generating a sense of well-being as a means of promoting healthy communities. There is a role for the environment in enabling people to feel connected to place; and growing evidence that physical activity and access to nature and opportunities for community interaction is an important contributor to mental health and wellbeing. It is worth noting that different groups or different areas of the UK feel differently about their lives and have different experiences, however data that compares different UK geographies has not yet been released. Four measures of personal well-being are examined: how satisfied people feel with their lives; how worthwhile they feel the things they do are; how happy they were yesterday; and how anxious they	a lack of clarity on issues such as 'Brexit' and general global economic uncertainty. These factors will all have major implications for health outcomes for the wider population but particularly for those in more deprived or vulnerable groups. Population profiles are also likely to continue to get older – this will likely result in changes to overall health outcomes with an increased number of long-term conditions and place an increasing burden on health provision and facilities.	strengthened multi-functional green infrastructure network; and policy approaches designed to reduce air pollution, decreasing noise pollution and reducing traffic congestion. Good design principles can combine with broader green infrastructure as key factors in fostering active travel, recreation and healthy lifestyles. The NPS should seek to ensure continued access to and provision of quality greenspace along with improvement of the physical environment in general. Ensuring continued or enhanced access to employment, educational, recreational / leisure and health services and facilities, along with adequate provision, should also be a priority. Improved walking and cycling facilities, along with open spaces and outdoor recreational facilities are vital to ensuring people have opportunities to undertake informal and formal physical activity outdoors in a safe manner. This will help to increase physical activity levels and improve general health and wellbeing.	

felt yesterday. Overall, personal well-being levels have increased in the UK. • Approximately 1 in 20 (4.7%) UK adults reported low satisfaction with their lives in July to September 2024. This showed no significant change from the same period in 2019 when the figure was 4.8%. • Individuals with low feelings of worthwhile decreased by 22% between 2011 and 2024 in the UK, and on average the UK had a 6.8% higher feelings of worth while compared with the EU-28 average • There was little change in ratings of happiness between 2011 and 2024, but the UK remains similar to the EU-28 average of 7.4 out of 10. According to data from the Office of National Statistics), the average (mean) rating of life satisfaction of people aged 15 years and over in the UK was 7.5 out of 10 in April to June 2024.		The NPS needs to ensure that energy developments are safe, both in terms of crime as well as accidents and engender a perception of safety.	

According to data published by Office for National Statistics from October to December 2022, 32.09% of adults rated they feel the things they do in life are worthwhile, which is a slight increase from 31.47% in October to December in 2011. More data published by the Office for National Statistics shows that the percentage of a very high level of happiness for people in the UK in 2023 was 43.05%, whereas the people with a reported low level of happiness was 8.83%. 7% of people in England through October 2023 to March 2024 reported feeling lonely often or always, which has remained similar to levels from 2013/2014 at 5-6%. Crime across England shows regional variations, with the East of England having the lowest rate of crime in 2023/24 (70.7 per 1000 people, as opposed to 104.4 per 1000 people in Yorkshire and The Humber). The level of crime has been broadly stable in recent years, however England and Wales recorded a significant 9% reduction in the year ending 2023/24.			

Underlying this were significant falls in stalking and harassment (11%) and public order offences (18%), and almost all other crime types saw non-significant falls.			
Resources and Waste – population and economic growth continues to be associated with increased resource use and waste generation. There is an urgent need to reverse trends in order to move towards a circular economy where resource efficiency is maximised and waste generation curbed. The UK generated 222.2 million tonnes of total waste in 2018, and it is estimated that 40.4 million tonnes of this was commercial and industrial (C&I) waste (2020). In 2021, 26,411,000 tonnes of Waste from Households (WfH) were generated in the UK with an overall recycling rate of 44.6%. In England, the recycling rate was 44.1%, in Wales it was 56.7% (2021). Around 14,644,000 tonnes of the UK's municipal waste went to landfill in 2018.	Declining. Continued growth will contribute towards a trend of increased waste and resource use. Interventions outside the planning system are helping to shift towards greater efficiencies in resource use and adherence to the waste hierarchy, with wider aspirations to work toward a circular economy but underlying waste generation volumes are anticipated to increase cumulatively.	The NPS should seek to reduce consumption of resources such as construction materials, e.g. through encouraging the use of recycled or secondary materials and allow a 'Circular Economy' to develop. The NPS can also help reduce the consumption of fuel by helping to provide electricity output to help facilitate a shift to more sustainable forms of transport such as Low and Zero Emission Vehicles.	Promote sustainable use of resources and natural assets.

Total UK commercial and industrial waste, comprising inert, non-hazardous arising which result from trade or businesses, was 36.1 million tonnes in 2018[10]. Around 80% of this total was generated in England. This was split between the commercial and industrial sectors by 27.5 and 13.6 million tonnes respectively. New energy generation development will impact on and interact with a wide range of resources such as use of construction materials (aggregate, concrete, etc.), waste generation and disposal etc. Construction will contribute to increases in the levels of waste generated, if building materials are not efficiently used / reused. With more waste being produced, trip kilometres to transport such waste for disposal will result in greater transport trip generation and increased emissions of air pollutants or greenhouse gases.			

[10] Last available figures – these figures are under review by Defra.

AoS Objectives and Guide Questions (updated AoS Framework)

The establishment of appropriate objectives and guide questions is central to the appraisal process and provides a method to enable the consistent and systematic assessment of the effects of the NPSs. The appraisal objectives described in this section are informed by: the examination of the baseline evidence, incorporating the identification of key issues; the review of plans and programmes; and comments received during the consultation on the Scoping Report (see Appendix B).

The development of AoS Objectives and Guide Questions also reflects national guidance on SEA and SA practice. Broadly, the objectives present the preferred social, economic or environmental outcome which typically involves minimising detrimental effects and enhancing positive effects where relevant. Guide questions for each of the objectives illustrate its relevance to energy infrastructure development and give more detail and focus to the appraisal process. The questions explore direct, indirect as well as cumulative and synergistic effects where appropriate.

The AoS framework is an iteration of that developed for the previous AoS of the Energy NPSs and has been updated to reflect changes to baseline and a review of latest legislation, plans and policies as well as changes in approaches to sustainability and energy policy.

Key elements of change relate to the need to reflect the change in policy direction as set in the NPS consultation document. These include the Clean Power 2030 Action Plan, which accelerates the delivery of renewable and low carbon power, reintroducing onshore wind into the NSIP regime, the Centralised Strategic Network Plan approach, Electricity Transmission Design Principles, amendments to approach to EfW and so on. The framework was also updated to better reflect principles such as avoiding environmental harm, being precautionary and embedding environmental protection, which are a cornerstone of the Environment Act 2021.

In addition, some objectives or guide questions were amended to provide greater or more succinct clarity on certain aspects, for example to better reflect the multiple receptors in respect of climate change. The updated framework was also influenced by recent AoS undertaken in respect of nuclear generation (proposed EN-7) which also examined an up-to-date baseline and recent plans and policies.

It is important to note that this updated AoS framework has only been applied to those elements of the NPS that have been updated as part of the review process undertaken i.e. EN-1, EN-3 and EN-5.

Table 4-4: Updated AoS Framework to update Energy NPS (EN-1, EN-3 and EN-5)

No.	AoS Objective	Guide Questions
1	Consistent with the national target of reducing carbon emissions to Net Zero by 2050	Will the updated NPSs support … • Reduction of the carbon emissions of the national portfolio of major energy infrastructure? • Reduction of direct and indirect emissions of all greenhouse gases, including carbon dioxide, during construction, operation and decommissioning? • Supply of energy from low carbon/renewable energy sources / use of low carbon/renewable energy? • Use carbon removals to offset residual emissions from energy such Negative Emissions Technologies (NET) and Nature Based Solutions (NBS)? • Creation of new carbon sinks/removals through natural sequestration including that by natural habitats, blue-green infrastructure and soils? • Support an energy system consistent with reducing carbon emissions to Net Zero by 2050 and long term emphasis on electrification of Clean Power 2030?
2	Maximise adaptation and resilience of built assets, communities and people as well as natural assets, habitats and species, to the multiple effects of climate change * *Adaptation is about taking steps to live with the effects	Will the updated NPS… • Promote future proofing against the effects and risks of climate change (e.g. flooding, sea level rise, coastal erosion and change in weather patterns)? • Encourage design for successful adaptation to the predicted changes in weather conditions and frequency of extreme weather events (freezing, heat waves, intense storms)? • Address the climate induced risks of cascading failures from interdependent infrastructure energy networks?

No.	AoS Objective	Guide Questions
	and managing the impact of climate change such as building quay walls and flood barriers or managing coasts through rollback. Resilience is the ability of a system to adsorb and bounce back after an adverse event.	• Lead to major infrastructure development that is flood resilient over its lifetime, considering the effects of climate change, without increasing the flood risk elsewhere and identifying opportunities to reduce the risk overall? • Avoid inappropriate development in areas at risk from flooding and coastal erosion? • Manage the risks of flooding and coastal erosion, particularly through working with natural processes? • Ensure provision of appropriate compensatory measures is in place when there is no other option to land take from areas of flood plain?
3	Enhance biodiversity and ecological networks, deliver biodiversity net gain, protect and support ecosystem resilience and functionality	Will the updated NPS… • Protect and enhance nationally designated sites such as SSSIs and National Nature Reserves, Marine Conservation Zones, Marine Protection Areas and Highly Protected Marine Areas, including those of potential or candidate designation? • Protect and enhance valued habitat and populations of protected/scarce species on locally designated sites, including Key Wildlife Sites, Local Wildlife Sites and Local Nature Reserves? • Protect the structure and function/ecosystem processes, including in the marine environment? • Protect and enhance the Nature Recovery Network? • Protect and enhance priority habitats and irreplaceable habitats, and the habitat of priority species? • Promote new habitat creation or restoration and linkages with existing habitats? • Protect and enhance the wider green and blue infrastructure network?

No.	AoS Objective	Guide Questions
		• Increase the resilience of biodiversity to the potential effects of climate change? • Reduce or avoid impacts to habitats with important roles in carbon sequestration? • Encourage sensitive or nature inclusive design in terrestrial and marine environments? • Ensure energy activities protect fish stocks and marine mammals? • Ensure energy activities do not exacerbate disturbance to bird populations? • Deliver a minimum 10% net gain in biodiversity for any new major infrastructure development? • Increase the resilience of biodiversity to the potential effects of climate change? • Prevent spread of invasive species (native and non-native), including new invasive species because of climate change?
4	Protect and enhance sites designated for their international importance for nature conservation purposes *(linked to separate HRA process for Energy NPS)*	Will the updated NPS… • Avoid the direct loss of, or indirect harm to, 'Habitats Sites' (SPAs, SACs and Ramsar sites), including those of potential designation (candidate SPAs, proposed SACs, Sites of Community Importance (SCI) and proposed Ramsar sites) and compensation sites both onshore and offshore? • Support continued improvements to the condition status of the UK's national site network?
5	Protect and enhance cultural heritage assets and their settings, and the wider historic environment	Will the updated NPS… • Conserve and enhance designated heritage assets and their settings (World Heritage Sites, Scheduled Monuments, Listed Buildings and structures, Registered Parks and Gardens, Registered Battlefields and Conservation Areas), as well as maritime assets such as protected wrecks?

No.	AoS Objective	Guide Questions
		• Conserve and enhance non-designated and / or locally listed heritage assets (including newly discovered heritage assets and archaeology) and their settings? • Address heritage assets at risk, or protect them from further threats? • Avoid significant harm to heritage assets, for example from the generation of noise, pollutants and visual intrusion? • Ensure appropriate archaeological assessment prior to development? • Maintain or improve the interpretation, understanding and appreciation of the historic environment? • Increase public access to heritage assets?
6	Protect and enhance the character and quality of the landscapes, townscapes and waterscapes and protect and enhance visual amenity	Will the updated NPS… • Avoid the development in National Parks and National Landscapes (formerly AONBs)? • Support the integrity of any areas designated for landscape value, including in conjunction with the provisions of any relevant Management Plan (e.g. National Parks, National Landscapes, Heritage Coasts and local landscape designations)? • Conserve and enhance the intrinsic character or setting of local landscapes or townscapes or waterscapes? • Minimise noise and light pollution from construction and operational activities on residential amenity and on sensitive locations, receptors and views? • Prevent reduced tranquility / preserve tranquility? • Conserve, protect and enhance natural environmental assets (e.g. parks and green spaces, common land, woodland / forests etc) where they contribute to landscape and townscape quality?

No.	AoS Objective	Guide Questions
7	Protect and enhance the water environment	Will the updated NPS… • Protect ground, surface, estuarine and coastal water quality in line with Water Framework Directive and Marine Strategy Framework requirements? • Result in changes to groundwater distribution and flow? • Safeguard the availability of water resources (surface and groundwater)? • Minimise the use of water resources / water consumption? • Protect the integrity of coastal and estuarine processes? • Reduce operational and accidental discharges to the water environment? • Protect the quality of the seabed and its sediments, and avoid significant effects on seabed morphology and sediment transport processes?
8	Protect and enhance air quality on a local, regional, national and international scale	Will the updated NPS… • Minimise emissions of dust and other air pollutants that affect human health or biodiversity? • Improve air quality within AQMAs and avoid the need for new AQMAs? • Promote enhancements to green infrastructure networks to help improve air quality?
9	Protect soil resources, promote use of brownfield land and avoid land contamination	Will the updated NPS… • Assist in facilitating the re-use of previously developed land? • Avoid development upon the best and most versatile agricultural land? • Ensure the protection of soil resources and avoid soil health degradation through sustainable soil management and re-use? • Seek to remediate contaminated land?

No.	AoS Objective	Guide Questions
		• Minimise development (hardstanding) footprint to reduce soil sealing?
10	Protect, enhance and promote geodiversity	Will the updated NPS… • Protect and enhance geodiversity resource? • Protect or enhance SSSIs designated for their geological interest? • Avoid the degradation and removal, wherever possible, of RIGS? • Protect geodiversity on the shoreline and marine waters? • Support access to, interpretation and understanding of geodiversity?
11	Improve health and well-being and safety for all citizens and reduce inequalities in health	Will the updated NPS… • Protect the health of communities through prevention of accidental pollutant discharges, exposure to electric and magnetic fields, shadow flicker or radiation? • Minimise nuisance on communities and their facilities including, noise, artificial light, odour, dust, steam, smoke and infestation of insects? • Result in loss of recreational and amenity land or loss of access? • Provide for facilities that can promote more social interaction and a more active lifestyle and enjoyment of the countryside and coasts? • Promote initiatives that enhance safety and personal security for all?
12	Promote sustainable transport and minimise detrimental impacts on strategic transport network and disruption to basic services and infrastructure	Will the updated NPS… • Prevent adverse changes to strategic transport infrastructure road/rail/airport? • Prevent loss or disruption to basic services and infrastructure (e.g. telecommunications, electricity, gas)? • Promote transportation of goods and people by low/zero carbon transport modes?

No.	AoS Objective	Guide Questions
		• Reduce travel distances to work and reduce the need for out commuting? • Facilitate working from home, remote working and home-based businesses?
13	To promote a strong economy with opportunities for local communities	Will the updated NPS … • Support enhanced security, reliability and affordability of the national energy supply? • Support creation of both temporary and permanent jobs and increase skills, particularly in areas of need? • Have wider socio-economic effects such as changes to the demographics, community services or house prices? • Delivery of infrastructure to support economic investment in the local economy?
14	Promote sustainable use of resources and natural assets	Will the updated NPS… • Reduce consumption of materials, energy and resources? • Promote sustainable waste management practices in line with the waste hierarchy? • Encourage the use of recycled and / or secondary materials? • Encourage the development of a circular economy? • Promote the use of low carbon materials and technologies? • Produce waste by-products that require appropriate management? • Promote the use of local suppliers that use sustainably-sourced and locally produced materials?

4. Assessment of NPS – updated EN-1

Introduction

The findings of the updated AoS of the updated Overarching Energy NPS (EN-1) are set out in this section of the report and address each of the updated AoS Objectives in turn. Many issues and effects for sustainability are cross-cutting and effects are reported where they are most relevant to avoid duplication of appraisal. Inter-relationships between topics and likely significant secondary, synergistic and cumulative effects are also reported where appropriate in each topic. Where significant adverse effects are predicted, possibilities for mitigation are suggested.

As noted in Section 1, only NPS EN-1, EN-3 and EN-5 are being updated. As such, this assessment has a focus on the material changes that have been made to the three ENs, while also reflecting any other text changes that informed previous assessments, against the updated AoS Framework.

Technology specific sustainability effects are reported in detail in Sections 6 to 7 in this report; appraisal findings reported here relate to likely generic effects and the overall effects for the updated Overarching NPS (EN-1).

The updated AoS is undertaken with consideration of the mitigation hierarchy to avoid harm in the first instance. Where this is not possible, then mitigation and enhancement are applied, followed by compensation where required. Note that for all assessments there is uncertainty as to the precise level of effect as this will be dependent upon the precise nature of the energy infrastructure and the area (or alternative areas) within which it could be located.

It should be borne in mind that updated EN-1 still makes clear that in exceptional circumstances the Secretary of State may still grant development consent for Critical National Priority NSIPs, where the public benefits of such development can be demonstrated to clearly outweigh any significant impacts. This approach is likely to result in significant residual adverse effects across the sustainability themes, in particular those related to the protection of the environment. Such exceptional residual significant adverse effects are not reflected in these assessments but are further considered in Section 8 Assessment of Critical National Priority for Low Carbon Infrastructure.

The process of assessment is undertaken in three steps, by first identifying the anticipated effects of the technologies set out in updated EN-1; then an assessment is made of the relevant text from the updated EN-1 in relation to each guide question identified under each AoS Objective and then conclusions of the assessment are made in relation to the significance of effects identified.

AoS Objective 1: Consistent with the national target of reducing carbon emissions to Net Zero by 2050

Anticipated effects

National policy for the development of new energy infrastructure has the potential to generate substantial GHG emissions. In preparing such policy, there will be a need to ensure that GHG emissions are reduced significantly throughout the lifetime of the infrastructure and that Net Zero is achieved through the promotion of low carbon and renewable generation as a core component of development ambitions alongside development of carbon capture usage and storage for combustion plants and application of negative emissions removals, both technological and nature-based.

National policy for the development of infrastructure should ensure that opportunities are taken for maximising tree cover, peatland restoration and other nature-based solutions, where practical. Amongst other benefits, careful site location and species selection in new woodland can contribute to carbon sequestration by absorbing increased amounts of CO2 from the atmosphere. Restoration and responsible management of peatland in unfavourable condition will allow the preservation a large carbon stock and avoid its release to the atmosphere. Carefully planned blue-green infrastructure alongside infrastructure development can also play an important role in carbon sequestration.

Assessment made in respect of updated EN-1

This assessment of the relevant policies and planning conditions set out in updated EN-1 has been undertaken considering each of the guide questions associated with AoS Objective 1. The assessment specifically considers any updates that have been made in updated EN-1 that materially change relevant policies previously set out in EN-1.

Reduction of the carbon emissions of the national portfolio of major energy infrastructure?

Updated EN-1 Part 2 recognises that there is an urgent need for different energy technologies to meet the decarbonisation target of net zero (100% reduction) by 2050 and the interim government targets of reducing GHG emissions by 68% by 2030 and 78% by 2035 compared to 1990 levels.

Updated EN-1 Part 2 aligns the GHG emissions reductions with that of government's latest Clean Power 2030 Action Plan which accelerates the delivery of renewable and low carbon power in the Great Britain to 2030 with at least 95% of the generation met by clean sources and a long term emphasis on electrification. EN-1 Part 2 recognises that significant increases in transmission and generation infrastructure development, locally and nationally, will be necessary to meet 2030 Clean Power target, including capacity targets of 43-50 GW of offshore wind, 27-29 GW of onshore wind, and 45-47 GW of solar power. These will be complemented by flexible capacity, including 23-27 GW of battery capacity, 4-6 GW of long-

duration energy storage, and development of flexibility technologies including gas carbon capture utilisation & storage and hydrogen and a commitment to nuclear beyond 2030.

To help meet these targets, updated EN-1 Part 3 continues to exclude highly carbon intensive new coal and large scale oil-fired electricity generation from the need case as they are not consistent with the transition to net zero.

Updated EN-1 Part 3 then establishes the urgent need for the following type of energy infrastructure: Offshore Wind (including floating wind), Onshore Wind, Solar PV, Wave, Tidal Range, Tidal Stream, Pumped Hydro, Energy from Waste (including Advanced Conversion Technologies) with Carbon Capture and Storage (CCS), Biomass with or without CCS, Natural Gas with or without CCS, Low carbon Hydrogen, Large-scale nuclear, Small Modular Reactors, Advanced Modular Reactors, and Fusion Power Plants, as well as Geothermal. It is noted that Onshore Wind has been added and EfW removed as a technology as part of the current updates.

Updated EN-1 Part 3 acknowledges that unabated natural gas for heat and electricity, and crude oil to provide fuels for transport, will still be needed during the transition to a Net Zero economy and that some residual unabated fossil fuels may even be needed beyond 2050. It notes that this can be consistent with the Net Zero target if the emissions from their use are balanced by negative emissions from Greenhouse Gas Removal technologies.

The updated AoS concludes that the updated mix of energy technologies set out in updated EN-1 will likely continue to deliver a significant reduction in GHG emissions and contribute its fair share of reductions to the carbon budgets and Net Zero targets.

Reduction of direct and indirect emissions of all greenhouse gases, including carbon dioxide, during construction, operation and decommissioning?

Updated EN-1 continues to set out in Part 5 that the construction, operation and decommissioning of energy infrastructure will in itself lead to GHG emissions and that, while all steps should be taken to reduce and mitigate climate change impacts (including by improving resource and energy efficiency in construction, operation and decommissioning), it is accepted that there will be residual emissions from energy infrastructure, particularly during the economy wide transition to net zero, and potentially beyond.

Updated EN-1 Part 5 continues to require that all proposals for energy infrastructure projects should include a GHG assessment as part of their Environmental Statement covering:

- A whole life GHG assessment showing construction, operational and decommissioning carbon impacts;
- An explanation of the steps that have been taken to drive down the climate change impacts at each of those stages;
- Measurement of embodied GHG impact from the construction stage;
- How reduction in energy demand and consumption during operation has been prioritised in comparison with other measures;

- How operational emissions have been reduced as much as possible through the application of best available technology for that type of technology;
- Calculation of operational energy consumption and associated GHG emissions;
- Whether and how any residual GHG emissions will be (voluntarily) offset or removed using a recognised framework; and
- Where there are residual emissions, the level of emissions and the impact of those on national and international efforts to limit climate change, both alone and where relevant in combination with other developments at a regional or national level, or sector level, if sectoral targets are developed.

Updated EN-1 Part 5 continues to note that the Secretary of State must be satisfied that the applicant has, as far as possible, assessed the GHG emissions of all stages of the development. Planning applications for new energy infrastructure should look for opportunities within the proposed development to embed nature-based or technological solutions to mitigate or offset the emissions of construction and decommissioning, but not of operational emissions. Steps taken to minimise and offset construction and decommissioning emissions should be set out in a GHG Reduction Strategy, secured under the development consent order.

In making a decision, updated EN-1 Part 5 continues to note that the Secretary of State should be content that the applicant has taken all reasonable steps to reduce the GHG emissions of the construction and decommissioning stage of the development. The Secretary of State should give appropriate weight to projects that embed nature-based or technological processes to mitigate or offset the emissions of construction and decommissioning within the proposed development. However, in light of the vital role energy infrastructure plays in the process of economy wide decarbonisation, the Secretary of State accepts that there are likely to be some residual emissions from construction and decommissioning of energy infrastructure.

With regards to decision making by the Secretary of State concerning operational GHG emissions, updated EN-1 Part 5 continues to acknowledge that operational GHG emissions are a significant adverse impact from some types of energy infrastructure which cannot be totally avoided (even with full deployment of CCS technology). Given the characteristics of these and other technologies and the range of non-planning policies that can be used aimed at decarbonising electricity generation such as UK ETS, Government has determined that operational GHG emissions are not reasons to prohibit the consenting of energy projects including those which use these technologies or to impose more restrictions on them in the planning policy framework than are set out in the energy NPSs (e.g. the CCR requirements).

Updated EN-1 continues to set out that operational emissions from energy infrastructure will be addressed in a managed, economy-wide manner, to ensure consistency with carbon budgets, net zero and our international climate commitments. The Secretary of State does not, therefore, need to assess individual applications for planning consent against operational carbon emissions and their contribution to carbon budgets, net zero and our international climate commitments.

Updated EN-1 Part 2 continues to set out the various levers outside of the planning system that will encourage the reduction of operational emissions from the energy sector. These are:

- Contracts for Difference (CfD) - The CfD scheme opened in 2014, with CfDs being awarded to developers of eligible projects through a competitive bidding process administered by National Grid's Electricity Systems Operator (ESO). The scheme has been hugely successful in driving substantial deployment of renewable electricity capacity at scale whilst rapidly reducing costs. The competitive nature of the scheme has been a crucial factor in minimising the costs of decarbonisation for consumers, contributing to the price per unit of offshore wind falling by around 65 per cent between the first allocation round in 2015 and the fourth in 2021, making offshore wind one of the lowest cost ways of generating electricity.
- Deployment of CCUS facilities - Government is developing business models to incentivise the deployment of Carbon Capture, Utilisation and Storage (CCUS) facilities and low carbon hydrogen production in the UK. The British Energy Security Strategy also committed to designing, by 2025, new business models for hydrogen transport and storage infrastructure.
- Power CCUS and Industrial Carbon Capture – Government will put in place a commercial framework which will enable developers to finance the construction and operation of power CCUS and Industrial Carbon Capture (ICC) facilities and CO2 transport and storage networks, stimulating a pipeline of projects and building a UK supply chain. For Power CCUS, government will introduce the Dispatchable Power Agreement Business Model, to incentivise power CCUS to play a role in the electricity system which complements renewables. For ICC, government will incentivise the deployment of carbon capture technology through the Industrial Carbon Capture Business Model for industrial users who often have no viable alternatives available to achieve deep decarbonisation, this will include Energy from Waste facilities.
- TRI Model - Government are also developing the Transportation and Storage regulatory investment ('TRI Model') which is based on an economic regulation funding model consisting of three elements: revenue model, economic regulatory regime and a government support package (GSP).
- UK Emissions Trading Scheme (UKETS
- Carbon Price Support (CPS)
- Emissions Performance Standard (EPS)

The updated AoS concludes that updated EN-1 requirements for a GHG assessment as part of the planning application continue to be strong as far as quantification of GHG emissions associated with construction and decommissioning. But the mechanisms for reducing operational emissions as calculated by the applicant continue to be deemed vague and do not provide firm assurances that operational emissions will indeed be capped at levels consistent with the carbon budgets and the Net Zero Strategy, as the various levers are still under development.

Supply of energy from low carbon/renewable energy sources / use of low carbon/renewable energy?

Updated EN-1 sets out that a mix of energy sources are required to ensure the UK can provide a secure, reliable, and affordable supply of energy, while at the same time meeting decarbonisation targets. While there remains a need for sources which will result in the continued emission of GHG (for example updated EN-1 continues to note that some limited residual use of unabated natural gas and crude oil may be needed beyond 2050 to meet energy objectives), it is considered that emissions can be balanced by negative emissions from Greenhouse Gas Removal technologies. Updated EN-1 provides new clear linkages to the Clean Power 2030 Action Plan which sets out infrastructure deployment pathways and generation capacity ranges that will ensure by 2030 clean sources produce at least 95% of Great Britain's generation, meeting the sixth Carbon Budget advice and pushing the country towards net zero 2050. All routes to a clean power system will require mass deployment of offshore wind, onshore wind, and solar and this is clearly set out in updated EN-1.

Use carbon removals to offset residual emissions from energy such Negative Emissions Technologies (NET) and Nature Based Solutions (NBS)?

Update EN-1 Part 5 continues to set out that planning applications for new energy infrastructure should look for opportunities within the proposed development to embed nature-based or technological solutions to mitigate or offset the emissions of construction and decommissioning. Steps taken to minimise and offset construction and decommissioning emissions should be set out in a GHG Reduction Strategy, secured under the development consent order. The GHG Reduction Strategy should consider the creation and preservation of carbon stores and sinks including through woodland creation, peatland restoration and through other natural habitats.

The updated AoS continues to conclude that updated EN-1 Part 5 places strong requirements on the applicant via preparation of a GHG offset strategy for residual construction and decommissioning emissions but that is not the case for residual operational emissions.

As an energy NPS, the updated AoS continues to note that updated EN-1 is not expected to cover Greenhouse Gas Removal (GGR) Strategy in terms of which technologies or nature-based solutions to apply for operational emissions.

Creation of new carbon sinks/removals through natural sequestration including that by natural habitats, blue-green infrastructure and soils?

Updated EN-1 Part 5 continues to set out that planning applications for new energy infrastructure should look for opportunities within the proposed development to embed nature-based or technological solutions to mitigate or offset the emissions of construction and decommissioning, but not the emissions from operation. Steps taken to minimise and offset construction and decommissioning emissions should be set out in a Greenhouse Gas Reduction Strategy, secured under the development consent order. The GHG Reduction Strategy should consider the creation and preservation of carbon stores and sinks including through woodland creation, peatland restoration and through other natural habitats. The

updated AoS continues to conclude that updated EN-1 requirements for the creation and preservation of carbon sinks are relatively strong in that they require firm considerations of such solutions.

Support an energy system consistent with reducing carbon emissions to Net Zero by 2050 and long term emphasis on electrification of Clean Power 2030?

As noted above, updated EN-1 sets out clear linkages to the Clean Power 2030 Action Plan which provides pathways to meeting net zero targets. The updated EN-1 notes that securing affordable, homegrown renewables means the power system will be able to run for increasing periods on low carbon generation, with renewables providing the vast majority of generation, and nuclear continuing to deliver a backbone of vital low carbon power. In addition to meeting the aims of Clean Power 2030, it is considered this approach is consistent with the overall objective of achieving Net Zero by 2050.

Assessment conclusions and summary

Considering policy in updated EN-1 as discussed above, Table 5-1 provides the summary assessment of updated EN-1 for the AoS Objective Reducing Carbon Emissions to Net Zero.

Minor positive effects continue to be predicted in the short term as unabated combustion technologies (biomass and natural gas) are potentially permitted alongside renewables and nuclear technologies and opportunities for the recovery of heat are maximised. In the medium to long term, the effects continue to be expected to become significant positive as earlier unabated combustion technologies get retrofitted with CCS, any new combustion technology is with CCS, nuclear continues to contribute zero carbon energy, renewables make a very significant proportion of the energy mix, recovery of heat continues to be maximised; and operational residual emissions are balanced by Greenhouse Gas Removal technologies, including those emissions from unabated natural gas plants used for peaking.

Table 5-1: Consistent with the national target of reducing carbon emissions to Net Zero by 2050 Objective Summary

AoS Objective: Consistent with the national target of reducing carbon emissions to Net Zero by 2050	**Assessment of generic effects (by timescale)**		
Guide questions: • Reduction of the carbon emissions of the national portfolio of major energy infrastructure? • Reduction of direct and indirect emissions of all greenhouse gases, including carbon dioxide, during construction, operation and decommissioning?	S	M	L
	- / +	**- / ++**	**++**

• Supply of energy from low carbon/renewable energy sources / use of low carbon/renewable energy? • Use carbon removals to offset residual emissions from energy such Negative Emissions Technologies (NET) and Nature Based Solutions (NBS)? • Creation of new carbon sinks/removals through natural sequestration including that by natural habitats, blue-green infrastructure and soils? • Support an energy system consistent with reducing carbon emissions to Net Zero by 2050 and long term emphasis on electrification of Clean Power 2030?			

AoS Objective 2: Maximise adaptation and resilience of built assets, communities and people as well as natural assets, habitats and species, to the multiple effects of climate change.

Anticipated effects

A greater degree of resilience to the unavoidable impacts of climate change on built assets, communities and people, will have to be incorporated into energy infrastructure design to address changes in temperature and rainfall patterns, along with more frequent extreme weather events (for example drought or flood) as well as sea level rise and coastal change and erosion.

Flood and drought risk and coastal change and erosion can also have significant impacts on natural assets, species and habitats and this should be considered in any energy infrastructure design through the implementation of multi-functional green-blue infrastructure and other similar appropriate measures or new approaches.

Nature-based solutions such as tree planting or peat restoration for carbon sequestration (as discussed in section 5) also provide for climate change adaptation through delivering urban cooling, wildlife benefit and contributing to flood reduction and will need to be considered in this regard. Note that while measures such as tree planting can be a very valuable contribution to

carbon sequestration (and other environmental benefits), the 'right solution' should be used in the right location i.e. tree planting may not always be the best solution in a particular location.

Assessment made in respect of updated EN-1

This assessment of the relevant policies and planning conditions set out in updated EN-1 has been undertaken considering each of the guide questions associated with AoS Objective 2.

Promote future proofing against the effects and risks of climate change (e.g. flooding, sea level rise, coastal erosion and change in weather patterns)?

Updated EN-1 Part 4.10 Climate Change Adaptation continues to recognise that climate change is already altering the UK's weather patterns and this will continue to accelerate depending on global carbon emissions. This means it is likely there will be more extreme weather events, such as heavy rainfall and very hot days will be more intense and more frequent, as well as climatic and seasonal changes such as hotter, drier summers and warmer and wetter winters. There is also a likelihood of increased flooding, drought, heatwaves, and intense rainfall events, as well as rising sea levels, increased storms and coastal change.

Updated EN-1 Part 4.10 continues to set out that applicants must consider the impacts of climate change when planning the location, design, build, operation and, where appropriate, decommissioning of new energy infrastructure. Key generic considerations that applicants should take into account to help ensure that energy infrastructure is resilient to climate change are:

- The ES should set out how the proposal will take account of the projected impacts of climate change, using government guidance and industry standard benchmarks such as the Climate Change Allowances for Flood Risk Assessments, Climate Impacts Tool, and British Standards for climate change adaptation, in accordance with the EIA Regulations.
- Applicants should assess the impacts on and from their proposed energy project across a range of climate change scenarios, in line with appropriate expert advice and guidance available at the time.
- Applicants should demonstrate that proposals have a high level of climate resilience built-in from the outset and should also demonstrate how proposals can be adapted over their predicted lifetimes to remain resilient to a credible maximum climate change scenario. These results should be considered alongside relevant research which is based on the climate change projections.
- Where energy infrastructure has safety critical elements (for example parts of new gas-fired power stations or some electricity sub-stations), the applicant should apply a credible maximum climate change scenario. Although the likelihood of this scenario is thought to be low, it is appropriate to take a risk-averse approach with elements of infrastructure which are critical to the safety of its operation.

Key generic considerations that the Secretary of State should take into account to help ensure that energy infrastructure is resilient to climate change are:

- The Secretary of State should be satisfied that applicants for new energy infrastructure have taken into account the potential impacts of climate change using the latest UK Climate Projections and associated research and expert guidance (such as the Environment Agency's Climate Change Allowances for Flood Risk Assessments or the Welsh Government's Climate change allowances and flood consequence assessments) available at the time the ES was prepared to ensure they have identified appropriate mitigation or adaptation measures. This should cover the estimated lifetime of the new infrastructure, including any decommissioning period. Should a new set of UK Climate Projections or associated research become available after the preparation of the ES, the Secretary of State (or the Examining Authority during the examination stage) should consider whether they need to request further information from the applicant.
- The Secretary of State should be satisfied that there are no features of the design of new energy infrastructure critical to its operation which may be seriously affected by more radical changes to the climate beyond that projected in the latest set of UK climate projections, taking account of the latest credible scientific evidence on, for example, sea level rise (for example by referring to additional maximum credible scenarios – i.e. from the Intergovernmental Panel on Climate Change or EA) and that necessary action can be taken to ensure the operation of the infrastructure over its estimated lifetime.
- If any adaptation measures give rise to consequential impacts (for example on flooding, water resources or coastal change) the Secretary of State should consider the impact of the latter in relation to the application as a whole and the impacts guidance set out in Part 5 of this NPS.
- Any adaptation measures should be based on the latest set of UK Climate Projections, the government's latest UK Climate Change Risk Assessment, when available and in consultation with the EA's Climate Change Allowances for Flood Risk Assessments or the Welsh Government's Climate change allowances and flood consequence assessments.
- Adaptation measures should be required to be implemented at the time of construction where necessary and appropriate to do so. However, where they are necessary to deal with the impact of climate change, and that measure would have an adverse effect on other aspects of the project and/or surrounding environment (for example coastal processes), the Secretary of State may consider requiring the applicant to keep the need for the adaptation measure under review, and ensure that the measure could be implemented should the need arise, rather than at the outset of the development (for example increasing height of existing, or requiring new, sea walls).

Further to this, updated EN-1 Part 4.7 continues to note that given the importance which the Planning Act 2008 places on good design and sustainability, the Secretary of State needs to be satisfied that energy infrastructure developments are sustainable and, having regard to regulatory and other constraints, are as attractive, durable, and adaptable (including taking account of natural hazards such as flooding) as they can be.

Updated EN-1 Part 5.6 continues to make reference to the National Flood and Coastal Erosion Risk Management Strategy which sets out a long term vision for a nation ready for and resilient

to flooding and coastal change. It notes that the government is committed to supporting coastal communities and ensuring flood risk management is fit for the challenges to be faced now and in the future. This means planning should ensure there is an understanding of coastal change over time and by preventing inappropriate development in areas that are vulnerable to coastal change or any development that adds to the impacts of physical changes to the coast and by directing development away from areas vulnerable to coastal change.

Given the strong policy as set out above, the updated AoS concludes that updated EN-1 will likely continue to lead to energy infrastructure that is resilient and adapted over its lifetime to the risks of climate change.

Encourage design for successful adaptation to the predicted changes in weather conditions and frequency of extreme weather events (freezing, heat waves, intense storms)?

Updated EN-1 Part 4 continues to set out that applicants must consider the impacts of climate change when planning the location, design, build, operation and, where appropriate, decommissioning of new energy infrastructure. Updated EN-1 further notes that given the importance which the Planning Act 2008 places on good design and sustainability, the Secretary of State needs to be satisfied that energy infrastructure developments are sustainable and, having regard to regulatory and other constraints, are as attractive, durable, and adaptable (including taking account of natural hazards such as flooding) as they can be.

Updated EN-1 Part 4 continues to detail that the Secretary of State should be satisfied that there are no features of the design of new energy infrastructure critical to its operation which may be seriously affected by more radical changes to the climate beyond that projected in the latest set of UK climate projections, taking account of the latest credible scientific evidence on, for example, sea level rise (for example by referring to additional maximum credible scenarios – i.e. from the Intergovernmental Panel on Climate Change or EA) and that necessary action can be taken to ensure the operation of the infrastructure over its estimated lifetime.

The aims of planning policy on development and flood risk are to ensure that flood risk from all sources of flooding is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to steer new development to areas with the lowest risk of flooding. Where new energy infrastructure is, exceptionally, necessary in such areas, policy aims to make it safe without increasing flood risk elsewhere and, where possible, by reducing flood risk overall. It should also be designed and constructed to remain operational in times of flood.

Given the strong policy as set out above, the updated AoS concludes that updated EN-1 will likely continue to lead to energy infrastructure that is designed for successful adaptation to the predicted changes in weather conditions and frequency of extreme weather events.

Address the climate induced risks of cascading failures from interdependent infrastructure energy networks?

Updated EN-1 Part 4 continues to set out that applicants must consider the impacts of climate change when planning the location, design, build, operation and, where appropriate, decommissioning of new energy infrastructure.

Updated EN-1 Part 4 continues to detail that the Secretary of State should be satisfied that there are no features of the design of new energy infrastructure critical to its operation which may be seriously affected by more radical changes to the climate beyond that projected in the latest set of UK climate projections, taking account of the latest credible scientific evidence on, for example, sea level rise (for example by referring to additional maximum credible scenarios – i.e. from the Intergovernmental Panel on Climate Change or EA) and that necessary action can be taken to ensure the operation of the infrastructure over its estimated lifetime.

Whilst updated EN-1 continues to note that applicants of new energy infrastructure must ensure the operation of the infrastructure over its estimated lifetime, and that any Flood Risk Assessment should consider the consequences of flood risk management infrastructure failure, updated EN-1 does not specifically set out the cascading risks associated with interdependent infrastructure energy networks should be addressed.

It is the recommendation of the updated AoS that updated EN-1 should be clarified to clearly set out measures to ensure that applicants consider and mitigate the risks of cascading failures from interdependent infrastructure energy networks.

Lead to major infrastructure development that is flood resilient over its lifetime, considering the effects of climate change, without increasing the flood risk elsewhere and identifying opportunities to reduce the risk overall?

Updated EN-1 Part 4 continues to clearly note that if new energy infrastructure is not sufficiently resilient against the possible impacts of climate change, it will not be able to satisfy the energy needs as outlined in Part 3 of the NPS.

Updated EN-1 Part 4 continues to recognise that climate change is already altering the UK's weather patterns and this will continue to accelerate depending on global carbon emissions. This means it is likely there will be more extreme weather events, such as heavy rainfall and very hot days will be more intense and more frequent, as well as climatic and seasonal changes such as hotter, drier summers and warmer and wetter winters. There is also a likelihood of increased flooding, drought, heatwaves, and intense rainfall events, as well as rising sea levels, increased storms and coastal change.

Updated EN-1 Part 4 continues to set out that applicants must consider the impacts of climate change when planning the location, design, build, operation and, where appropriate, decommissioning of new energy infrastructure. Key generic considerations that applicants should take into account to help ensure that energy infrastructure is resilient to climate change include that:

- Applicants should assess the impacts on and from their proposed energy project across a range of climate change scenarios, in line with appropriate expert advice and guidance available at the time.

- Applicants should demonstrate that proposals have a high level of climate resilience built-in from the outset and should also demonstrate how proposals can be adapted over their predicted lifetimes to remain resilient to a credible maximum climate change scenario. These results should be considered alongside relevant research which is based on the climate change projections.

Key generic considerations that the Secretary of State should take into account to help ensure that energy infrastructure is resilient to climate change are:

- The Secretary of State should be satisfied that applicants for new energy infrastructure have taken into account the potential impacts of climate change using the latest UK Climate Projections and associated research and expert guidance (such as the Environment Agency's Climate Change Allowances for Flood Risk Assessments or the Welsh Government's Climate change allowances and flood consequence assessments) available at the time the ES was prepared to ensure they have identified appropriate mitigation or adaptation measures. This should cover the estimated lifetime of the new infrastructure, including any decommissioning period. Should a new set of UK Climate Projections or associated research become available after the preparation of the ES, the Secretary of State (or the Examining Authority during the examination stage) should consider whether they need to request further information from the applicant.
- The Secretary of State should be satisfied that there are no features of the design of new energy infrastructure critical to its operation which may be seriously affected by more radical changes to the climate beyond that projected in the latest set of UK climate projections, taking account of the latest credible scientific evidence on, for example, sea level rise (for example by referring to additional maximum credible scenarios – i.e. from the Intergovernmental Panel on Climate Change or EA) and that necessary action can be taken to ensure the operation of the infrastructure over its estimated lifetime.
- If any adaptation measures give rise to consequential impacts (for example on flooding, water resources or coastal change) the Secretary of State should consider the impact of the latter in relation to the application as a whole and the impacts guidance set out in Part 5 of this NPS.
- Any adaptation measures should be based on the latest set of UK Climate Projections, the government's latest UK Climate Change Risk Assessment, when available and in consultation with the EA's Climate Change Allowances for Flood Risk Assessments or the Welsh Government's Climate change allowances and flood consequence assessments.

Updated EN-1 Part 5 continues to note that for projects to pass an Exception Test, the applicant is required to demonstrate that:

- the project would provide wider sustainability benefits to the community that outweigh flood risk; and
- the project will be safe for its lifetime, taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

It further notes that all development should be designed to ensure there is no increase in flood risk elsewhere, accounting for the predicted impacts of climate change throughout the lifetime of the development. There should be no net loss of floodplain storage and any deflection or constriction of flood flow routes should be safely managed within the site. Mitigation measures should make as much use as possible of natural flood management techniques.

Given the strong policy as set out above, the updated AoS concludes that updated EN-1 will likely continue to lead to energy infrastructure that is resilient and adapted over its lifetime to the risks of climate change without increasing the flood risk elsewhere and identifying opportunities to reduce the risk overall.

Avoid inappropriate development in areas at risk from flooding and coastal erosion?

Update EN-1 Part 5.6 Coastal Change continues to deal specifically with onshore energy infrastructure projects situated on the coast, which should:

- ensure that policies and decisions in coastal areas are based on an understanding of coastal change over time
- prevent new development from being put at risk from coastal change by:
    - avoiding inappropriate development in areas that are vulnerable to coastal change or any development that adds to the impacts of physical changes to the coast, and
    - directing development away from areas vulnerable to coastal change.
- ensure that the risk to development which is, exceptionally, necessary in coastal change areas because it requires a coastal location and provides substantial economic and social benefits to communities, is managed over its planned lifetime; and
- ensure that plans are in place to secure the long-term sustainability of coastal areas.

Where relevant, applicants should undertake coastal geomorphological and sediment transfer modelling to predict and understand impacts and help identify relevant mitigating or compensatory measures.

The ES should include an assessment of the effects on the coast, tidal rivers and estuaries. In particular, applicants should assess:

- the impact of the proposed project on coastal processes and geomorphology, including by taking account of potential impacts from climate change. If the development will have an impact on coastal processes the applicant must demonstrate how the impacts will be managed to minimise adverse impacts on other parts of the coast
- the implications of the proposed project on strategies for managing the coast as set out in Shoreline Management Plans (SMPs) (which provide a large-scale assessment of the physical risks associated with coastal processes and present a long term policy framework to reduce these risks to people and the developed, historic and natural environment in a sustainable manner), any relevant Marine Plans, River Basin

Management Plans, and capital programmes for maintaining flood and coastal defences and Coastal Change Management Areas

- how coastal change could affect flood risk management infrastructure, drainage and flood risk
- the effects of the proposed project on maintaining coastal recreation sites and features
- the vulnerability of the proposed development to coastal change, taking account of climate change, during the project's operational life and any decommissioning period.

Applicants must demonstrate that full account has been taken of the potential effects of climate change on these risks.

Applicants should propose appropriate mitigation measures to address adverse physical changes to the coast, in consultation with the MMO, the EA/NRW, LPAs, other statutory consultees, Coastal Partnerships and other coastal groups, as it considers appropriate. Where this is not the case the Secretary of State should consider what appropriate mitigation requirements might be attached to any grant of development consent.

The Secretary of State should be satisfied that the proposed development will be resilient to coastal erosion and deposition, taking account of climate change, during the project's operational life and any decommissioning period. Proposals that aim to facilitate the relocation of existing energy infrastructure from unsustainable locations which are at risk from coastal change, should be supported where it would result in climate-resilient infrastructure.

The Secretary of State should not normally consent new development in areas of dynamic shorelines where the proposal could inhibit sediment flow or have an adverse impact on coastal processes at other locations. Impacts on coastal processes must be managed to minimise adverse impacts on other parts of the coast. Where such proposals are brought forward consent should only be granted where the Secretary of State is satisfied that the benefits (including need) of the development outweigh the adverse impacts.

The Secretary of State should ensure that applicants have restoration plans for areas of foreshore disturbed by direct works and will undertake pre- and postconstruction coastal monitoring arrangements with defined triggers for intervention and restoration.

The Secretary of State should examine the broader context of coastal protection around the proposed site, and the influence in both directions, i.e. coast on site, and site on coast.

The Secretary of State should consult the MMO on projects which could impact on coastal change in England, or NRW for projects in Wales, since the MMO or NRW may also be involved in considering other projects which may have related coastal impacts.

In addition to this NPS the Secretary of State must have regard to the appropriate marine policy documents, as provided for in the Marine and Coastal Access Act 2009. The Secretary of State may also have regard to any relevant SMPs

Furthermore, updated EN-1 Part 4.10 continues to set out that adaptation measures should be required to be implemented at the time of construction where necessary and appropriate to do so. However, where they are necessary to deal with the impact of climate change, and that measure would have an adverse effect on other aspects of the project and/or surrounding environment (for example coastal processes), the Secretary of State may consider requiring the applicant to review the adaptation measure, and ensure that the measure could be implemented should the need arise, rather than at the outset of the development (for example increasing height of existing, or requiring new, sea walls).

Given the strong policy as set out above, the AoS concludes that updated EN-1 will likely continue to steer development away from areas likely to be affected by coastal erosion or where this is not possible ensure that coastal change can be managed throughout the lifetime of the energy infrastructure.

Manage the risks of flooding and coastal erosion, particularly through working with natural processes?

Update EN-1 Part 4.10 Climate Change Adaptation continues to set out that new energy infrastructure will typically be a long-term investment and will need to remain operational over many decades, in the face of a changing climate. Consequently, applicants must consider the direct (e.g. flooding of buildings and indirect (e.g. flooded access roads to the site) impacts of climate change when planning the location, design, build, operation and, where appropriate, decommissioning of new energy infrastructure.

Updated EN-1 Part 4.10 continues to acknowledge that in certain circumstances, measures implemented to ensure a scheme can adapt to climate change may give rise to additional impacts, for example as a result of protecting against flood risk, there may be consequential impacts on coastal change.

Update EN-1 Part 4.10 further continues to set out that adaptation measures should be required to be implemented at the time of construction where necessary and appropriate to do so. However, where they are necessary to deal with the impact of climate change, and that measure would have an adverse effect on other aspects of the project and/or surrounding environment (for example coastal processes), the Secretary of State may consider requiring the applicant to ensure that the adaptation measure could be implemented should the need arise, rather than at the outset of the development (for example increasing height of existing, or requiring new, sea walls).

Updated EN-1 Part 5.8 continues to address Flood Risk specifically. It recognises that having resilient energy infrastructure not only reduces the risk of flood damages to the infrastructure, it also reduces the disruptive impacts of flooding on those homes and businesses that rely on that infrastructure. Although flooding cannot be wholly prevented, its adverse impacts can be avoided or reduced through good planning and management.

All buildings in flood risk areas can improve their preparedness to reduce costs and disruption to key public services when a flood happens. Where infrastructure is not better protected as part of a wider community scale flood defence scheme, those who own and run infrastructure

sites – whether in public or private hands – are expected to take action to keep water out, minimise the damage if water gets in through flood-resilient materials, and reduce the disruption caused. This includes effective contingency planning to mitigate the impacts of flooding on the delivery of important services.

The aims of planning policy on development and flood risk are to ensure that flood risk from all sources of flooding is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to steer new development to areas with the lowest risk of flooding. Where new energy infrastructure is, exceptionally, necessary in such areas, policy aims to make it safe without increasing flood risk elsewhere and, where possible, by reducing flood risk overall. It should also be designed and constructed to remain operational in times of flood. Proposals that aim to facilitate the relocation of existing energy infrastructure from unsustainable locations which are or will be at unacceptable risk of flooding, should be supported where it would result in climate-resilient infrastructure.

For all energy projects in Flood Zones 2 and 3 in England or Zones B and C in Wales, a site-specific flood risk assessment (FRA) should be provided by the applicant. In Flood Zone 1 in England or Zone A in Wales, an assessment should accompany all proposals involving: sites of 1 hectare or more; land which has been identified by the EA or NRW as having critical drainage problems; land identified (for example in a local authority strategic flood risk assessment) as being at increased flood risk in future; land that may be subject to other sources of flooding (for example surface water); and where the EA or NRW, Lead Local Flood Authority, Internal Drainage Board or other body have indicated that there may be drainage problems.

Applicants for projects which may be affected by, or may add to, flood risk should arrange pre-application discussions with the EA, and, where relevant, other bodies such as Lead Local Flood Authorities, Internal Drainage Boards, sewerage undertakers, navigation authorities, highways authorities and reservoir owners and operators. Such discussions should identify the likelihood and possible extent and nature of the flood risk, help scope the FRA, and identify the information that will be required by the Secretary of State to reach a decision on the application when it is submitted. The Secretary of State should advise applicants to undertake these steps where they appear necessary but have not yet been addressed.

If the EA, NRW or another flood risk management authority has reasonable concerns about the proposal on flood risk grounds, the applicant should discuss these concerns with the EA or NRW and take all reasonable steps to agree ways in which the proposal might be amended, or additional information provided, which would satisfy the authority’s concerns.

The Sequential Test ensures that a sequential, risk-based approach is followed to steer new development to areas with the lowest risk of flooding, taking all sources of flood risk and climate change into account. Where it is not possible to locate development in low-risk areas, the Sequential Test should go on to compare reasonably available sites with medium risk areas and then, only where there are no reasonably available sites in low and medium risk areas, within high-risk areas.

The technology specific NPSs continue to set out some exceptions to the application of the Sequential Test. However, when seeking development consent on a site allocated in a development plan through the application of the Sequential Test, informed by a strategic flood risk assessment, applicants need not apply the Sequential Test, provided the proposed development is consistent with the use for which the site was allocated and there is no new flood risk information that would have affected the outcome of the test.

Consideration of alternative sites should take account of the policy. All projects should apply the sequential approach to locating development within the site.

In determining an application for development consent, the Secretary of State should be satisfied that where relevant:

- the application is supported by an appropriate FRA
- the Sequential Test has been applied and satisfied as part of site selection
- a sequential approach has been applied at the site level to minimise risk by directing the most vulnerable uses to areas of lowest flood risk
- the proposal is in line with any relevant national and local flood risk management strategy
- sustainable drainage systems (SuDs) (as required in the next paragraph on National Standards) have been used unless there is clear evidence that their use would be inappropriate
- in flood risk areas the project is designed and constructed to remain safe and operational during its lifetime, without increasing flood risk elsewhere
- the project includes safe access and escape routes where required, as part of an agreed emergency plan, and that any residual risk can be safely managed over the lifetime of the development
- land that's likely to be needed for present or future flood risk management infrastructure has been appropriately safeguarded from development to the extent that development would not prevent or hinder its construction, operation or maintenance

For energy projects which have drainage implications, approval for the project's drainage system, including during the construction period, will form part of the development consent issued by the Secretary of State. The Secretary of State will therefore need to be satisfied that the proposed drainage system complies with any National Standards published by Ministers under Paragraph 5(1) of Schedule 3 to the Flood and Water Management Act 2010.

In addition, the development consent order, or any associated planning obligations, will need to make provision for appropriate operation and maintenance of any SuDS throughout the project's lifetime. Where this is secured through the adoption of any SuDS features, any necessary access rights to property will need to be granted.

Where relevant, the Secretary of State should be satisfied that the most appropriate body is being given the responsibility for maintaining any SuDS, taking into account the nature and

security of the infrastructure on the proposed site. Responsible bodies could include, for example the landowner, the relevant lead local flood authority or water and sewerage company (through the Ofwat-approved Sewerage Sector Guidance), or another body, such as an Internal Drainage Board.

Energy projects should not normally be consented within Flood Zone 3b the Functional Floodplain (where water has to flow or be stored in times of flood), or Zone C2 in Wales, or on land expected to fall within these zones within its predicted lifetime. This may also apply where land is subject to other sources of flooding (for example surface water). However, where essential energy infrastructure has to be located in such areas, for operational reasons, they should only be consented if the development will not result in a net loss of floodplain storage and will not impede water flows.

Exceptionally, where an increase in flood risk elsewhere cannot be avoided or wholly mitigated, the Secretary of State may grant consent if they are satisfied that the increase in present and future flood risk can be mitigated to an acceptable level and taking account of the benefits of, including the need for, nationally significant energy infrastructure as set out in Part 3 above. In any such case the Secretary of State should make clear how, in reaching their decision, they have weighed up the increased flood risk against the benefits of the project, taking account of the nature and degree of the risk, the future impacts on climate change, and advice provided by the EA or NRW and other relevant bodies.

Given the strong policy in updated EN-1 as set out above, the updated AoS concludes that updated EN-1 will likely continue to lead to energy infrastructure development capable of managing the risks associated with flooding over the energy infrastructure's lifetime, without increasing the flood risk elsewhere and identifying opportunities to reduce the risk overall.

Ensure provision of appropriate compensatory measures is in place when there is no other option to land take from areas of flood plain?

Updated EN-1 Part 5.8 notes that a Sequential Test should be used to ensure that a sequential, risk-based approach is followed to steer new development to areas with the lowest risk of flooding, taking all sources of flood risk and climate change into account. Where it is not possible to locate development in low-risk areas, the Sequential Test should go on to compare reasonably available sites with medium risk areas and then, only where there are no reasonably available sites in low and medium risk areas, within high-risk areas.

Update EN-1 Part 5.8 further notes that where a development may result in an increase in flood risk elsewhere through the loss of flood storage, on-site level-for-level compensatory storage, accounting for the predicted impacts of climate change over the lifetime of the development, should be provided. Where it is not possible to provide compensatory storage on site, EN-1 continues to note it may be acceptable to provide it off-site if it is hydraulically and hydrologically linked. Where development may cause the deflection or constriction of flood flow routes, these will need to be safely managed within the site.

Updated EN-1 Part 4.2 continues to note that CNP infrastructure applications are required to set out how residual impacts will be compensated for as far as possible. Applicants are also

required to set out how any mitigation or compensation measures will be monitored and reporting agreed to ensure success and that action is taken. Changes to measures may be needed e.g. adaptive management. The cumulative impacts of multiple developments with residual impacts should also be considered.

Given the strong policy in updated EN-1 as set out above, the update AoS concludes that updated EN-1 will likely continue to lead to energy infrastructure development capable of appropriately compensating when there is no other option that to land take from areas of flood plain.

Assessment conclusions and summary

The policies set out in updated EN-1 sections on Climate Change Adaptation, Coastal Change and Flood Risk (as discussed above) continue to be considered to largely address AoS Objective 2 Maximise adaptation and resilience to climate change. The summary assessment is set out in Table 5-2.

Updated EN-1 continues to ensure that at the time the ES is prepared by the applicants:

- The latest UK Climate Projections and associated research and expert guidance are taken into account; and
- impacts on and from their proposed energy project across a range of climate change scenarios are considered; and in particular demonstration of how proposals can be adapted over their predicted lifetimes to remain resilient to a credible maximum climate change scenario.

Updated EN-1 continues to detail climate adaptation requirements and considerations in relation to onshore energy infrastructure projects situated on the coast. It covers coastal erosion and deposition specifically, acknowledging that the impact of climate change on such processes and the need to address this. It also addresses pluvial, riverine and coastal flooding, again acknowledging the impact of climate change on flooding and sets out specific planning conditions for energy infrastructure. It also sets requirements for the management of other climate change risks associated with periods of limited water availability, storms, heatwaves and wildfires over the lifetime of the energy infrastructure.

Whilst updated EN-1 continues to note that applicants of new energy infrastructure must ensure the operation of the infrastructure over its estimated lifetime, and that any Flood Risk Assessment should consider the consequences of flood risk management infrastructure failure, update EN-1 does not specifically set out the potential climate induced risks of cascading failures from interdependent infrastructure. It is a recommendation of the updated AoS that updated EN-1 should be clarified to ensure that applicants consider and mitigate the risks of cascading failures from interdependent infrastructure energy networks.

Updated EN-1 continues to set out that all development should be designed to ensure there is no increase in flood risk elsewhere, accounting for the predicted impacts of climate change throughout the lifetime of the development. There should be no net loss of floodplain storage and any deflection or constriction of flood flow routes should be safely managed within the site.

Mitigation measures should make as much use as possible of natural flood management techniques.

Updated EN-1 continues to set out that applicants should consider whether to take reasonable steps to maximise use of nature-based solutions to address the impacts of flooding and coastal erosion, including the use of SUDS alongside other conventional techniques.

It is considered that updated EN-1 continues to provide a robust approach to ensuring that issues relating to a changing climate and the need to adapt to this in the construction, operation and decommissioning of energy related infrastructure will be considered as part of any development. This will ensure that resilience to climate change is a key component of these developments with beneficial effects from the short, through to the long term and with effects becoming potentially significant as more climate resilient energy infrastructure is built over time.

Table 5-2: Enhance biodiversity and ecological networks, deliver biodiversity net gain, protect and support ecosystem resilience and functionality Objective Summary

AoS Objective: Enhance biodiversity and ecological networks, deliver biodiversity net gain, protect and support ecosystem resilience and functionality	**Assessment of generic effects (by timescale)**		
Guide questions: • Promote future proofing against the effects and risks of climate change (e.g. flooding, sea level rise, coastal erosion and change in weather patterns)? • Encourage design for successful adaptation to the predicted changes in weather conditions and frequency of extreme weather events (freezing, heat waves, intense storms)? • Address the climate induced risks of cascading failures from interdependent infrastructure energy networks? • Lead to major infrastructure development that is flood and coastal erosion resilient over its lifetime, considering the effects of climate change, without increasing the flood or coastal erosion risk elsewhere and identifying opportunities to reduce the risk overall? • Avoid inappropriate development in areas at risk from flooding and coastal erosion?	S	M	L
	+	**++**	**++**

• Manage the risks of flooding and coastal erosion, particularly through working with natural processes? • Ensure provision of appropriate compensatory measures is in place when there is no other option to land take from areas of flood plain?			

AoS Objective 3: Enhance biodiversity and ecological networks, deliver biodiversity net gain, protect and support ecosystem resilience and functionality

Anticipated effects

The scope and scale of the development enabled by the NPS has the potential for a range of impacts on the natural environment and biodiversity including loss of habitat and species, disturbance, pollution, habitat fragmentation/severance/isolation, obstructions, changes to terrestrial microclimates and changes to coastal and marine processes due to construction, operation and decommissioning activities associated with energy infrastructure.

Therefore, the NPS should aim to protect and enhance all sites of biodiversity importance and place a particular emphasis on protecting sites designated for nature conservation. It should not allow energy development on irreplaceable habitats, such as ancient woodland and ancient and veteran trees except in wholly exceptional circumstances and with appropriate compensation measures.

The NPS should explore opportunities for new habitat creation and enhancement associated with energy developments, e.g. through contributing to the Local Nature Recovery Strategy and helping establish the Nature Recovery Network. The potential for biodiversity creation in brownfield sites should be also taken into account, noting that some brownfield sites will be protect in their own right or have high biodiversity value already so won't be adequate for habitat creation in these circumstances.

Loss of biodiversity to be halted and reversed by the NPS through the achievement of Biodiversity Net Gain, with a target of at least 10%, and reversing the decline in species abundance by the end of 2030 aligning with the Environment Act 2021 statutory targets.

Whilst maintaining and enhancing nature based or seeking multiple ecosystem benefits and solutions such as the application of nature-based solutions (peatlands, native woodlands, saltmarsh and sea grass meadows, traditionally managed habitats such as hedgerows, hay meadows, heathlands and old orchards) will have a significant role to play in helping the UK hit net zero by 2050 alongside improving biodiversity.

Finally, the NPS should support cohesive ecosystems and ecological networks that help habitats and species adapt to the consequences of climate change.

Assessment made in respect of updated EN-1

This assessment of the relevant policies and planning conditions set out in updated EN-1 has been undertaken considering each of the guide questions associated with AoS Objective 3.

Protect and enhance nationally designated sites such as SSSIs and National Nature Reserves, Marine Conservation Zones, Marine Protection Areas and Highly Protected Marine Areas, including those of potential or candidate designation?

Updated EN-1 Part 5 Biodiversity and Geological Conservation continues to acknowledge that many SSSIs are also designated as sites of international importance and will be protected accordingly (see assessment for AoS Objective 4 concerning sites of internationally protected sites). Those that are not, or those features of SSSIs not covered by an international designation, should be given a high degree of protection. Most National Nature Reserves are notified as SSSIs.

Development on land within or outside a SSSI, and which is likely to have an adverse effect on it (either individually or in combination with other developments), should not normally be permitted. The only exception is where the benefits (including need) of the development in the location proposed clearly outweigh both its likely impact on the features of the site that make it of special scientific interest, and any broader impacts on the national network of SSSIs. The Secretary of State should use requirements and/or planning obligations to mitigate the harmful aspects of the development and, where possible, to ensure the conservation and enhancement of the site's biodiversity or geological interest.

Updated EN-1 Part 5 continues to set out that the protected feature or features and the conservation objectives for the Marine Conservation Zones (MCZ) are stated in the designation order for the MCZ and that the Secretary of State is bound by the duties in relation to MCZs imposed by sections 125 and 126 of the Marine and Coastal Access Act 2009. Note that as a matter of policy, the following should be given the same protection as sites covered by the Marine and Coastal Access Act 2009 and a MCZ assessment will also be required in respect of: proposed Marine Conservation Zones and sites identified or required, as measures of equivalent environmental benefit for damage to potential Marine Conservation Zones.

Updated EN-1 Part 5 continues to reference Marine Protected Areas (MPA) which is a term used to describe the network of habitat sites, SSSIs and MCZs and Highly Protected Marine Areas (HPMAs) in the English and Welsh marine environment and that the Secretary of State should assess the impact, either alone or in combination, on all designated MPA sites when making any decision on development consent. Updated EN-1 Part 5 Coastal Change further continues to set out that the applicant should be particularly careful to identify any effects of physical changes on the integrity and special features of Marine Protected Areas (MPAs). These could include MCZs, HMPAs, 'habitat sites' including Special Areas of Conservation and Special Protection Areas with marine features, Ramsar Sites, Sites of Community Importance, and SSSIs with marine features.

Where the development is subject to EIA, the applicant should ensure that the ES clearly sets out any effects on internationally, nationally, and locally designated sites of ecological or geological conservation importance (including those outside England and Wales), on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity, including irreplaceable habitats.

Where EIA is not required, the applicant should provide environmental information proportionate to the infrastructure to help the Secretary of State consider thoroughly the potential effects of a proposed project.

The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests.

As a general principle, development should, in line with the mitigation hierarchy, aim to avoid significant harm to biodiversity and geological conservation interests, including through mitigation and consideration of reasonable alternatives. Where significant harm cannot be avoided, impacts should be mitigated and as a last resort, appropriate compensation measures should be sought.

If significant harm to biodiversity resulting from a development cannot be avoided (for example through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then the Secretary of State will give significant weight to any residual harm and consent may be refused.

The updated AoS concludes that updated EN-1 will likely continue to result in new energy infrastructure which will protect and enhance nationally designated sites except in the circumstances of overriding public benefits considerations (or application of CNP) outweighing any loss or deterioration but even the Secretary of State is bound to use requirements and/or planning obligations to mitigate, and compensate, the harmful aspects of the development and, where possible, to ensure the conservation and enhancement of the site's biodiversity or geological interest.

Protect and enhance valued habitat and populations of protected/scarce species on locally designated sites, including Key Wildlife Sites, Local Wildlife Sites and Local Nature Reserves?

Updated EN-1 Part 5 Biodiversity and Geological Conservation continues to set out that sites of regional and local biodiversity and geological interest, which include Regionally Important Geological Sites, Local Nature Reserves and Local Wildlife Sites, are areas of substantive nature conservation value and make an important contribution to ecological networks and nature's recovery. They can also provide wider benefits including public access (where agreed), climate mitigation and helping to tackle air pollution. National planning policy expects plans to identify and map Local Wildlife sites, and to include policies that not only secure their protection from harm or loss but also help to enhance them and their connection to wider ecological networks.

Where the development is subject to EIA, the applicant should ensure that the ES clearly sets out any effects on internationally, nationally, and locally designated sites of ecological or geological conservation importance (including those outside England and Wales), on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity, including irreplaceable habitats.

Where EIA is not required, the applicant should provide environmental information proportionate to the infrastructure to help the Secretary of State consider thoroughly the potential effects of a proposed project.

The Secretary of State should give due consideration to such regional or local designations. However, given the need for new nationally significant infrastructure, these designations should not be used in themselves to refuse development consent. Development will still be expected to comply with the biodiversity and geological conservation requirements set out in this NPS.

The updated AoS concludes that updated EN-1 will likely provide adequate levels of protection to locally designated sites except in the circumstances of overriding public benefits considerations where the Secretary of State may not refuse development consent.

Protect the structure and function/ecosystem processes, including in the marine environment?

Updated EN-1 continues to note that applicants should consider wider ecosystem services and benefits of natural capital when designing enhancement measures. EN-1 also clarifies that this should include the marine environment

Note also continues to be made that consideration should be given to improvements to, and impacts on, habitats and species in, around and beyond developments, for wider ecosystem services and natural capital benefits, beyond those under protection and identified as being of principal importance. This may include considerations and opportunities identified through Local Nature Recovery Strategies, and national goals and targets set through the Environment Act 2021 and the Environmental Improvement Plan 2023.

Protect and enhance the Nature Recovery Network?

Updated EN-1 Part 4 continues to set out that the Environment Act (2021) mandated the preparation of Local Nature Recovery Strategies (LNRSs) across England. They are a new system of spatial strategies for nature recovery and will play a major role in providing detail on the best locations to create, enhance and restore nature and deliver wider environmental benefits. LNRSs will also agree priorities for nature recovery and map the most valuable existing areas for nature. They will be critical in delivering new government targets for species abundance and habitat creation commitments, as well as other pressing environmental outcomes for water and flood risk, carbon and trees. LNRSs will also drive the creation of a Nature Recovery Network (NRN), a major commitment in the government's Environment Improvement Plan.

Note also continues to be made in updated EN-1 that applications for development consent should be accompanied by a statement demonstrating how opportunities for delivering wider environmental net gains have been considered, and where appropriate, incorporated into proposals as part of good design (including any relevant operational aspects) of the project. A number of tools and guidance documents are also detailed which could help during consideration of projects.

The updated AoS concludes that updated EN-1 continues to set out mechanisms which will help to protect and enhance elements such as the Nature Recovery Network, through consideration of natural capital assets and ecosystem services.

Protect and enhance priority habitats, irreplaceable habitats and the habitat of priority species?

Updated EN-1 Part 5 continues to set out that many individual wildlife species receive statutory protection under a range of legislative provisions. Other species and habitats have been identified as being of principal importance for the conservation of biodiversity in England and Wales, as well as for their continued benefit for climate mitigation and adaptation and thereby requiring conservation action.

The Secretary of State should ensure that these species and habitats are protected from the adverse effects of development by using requirements, planning obligations, or licence conditions. The Secretary of State should refuse consent where harm to the habitats or species and their habitats would result, unless the benefits (including need) of the development outweigh that harm. In this context the Secretary of State should give substantial weight to any such harm to the detriment of biodiversity features of national or regional importance which it considers may result from a proposed development.

The updated EN-1 also continues to note that irreplaceable habitats are habitats which would be technically very difficult (or take a very significant time) to restore, recreate or replace once destroyed, taking into account their age, uniqueness, species diversity or rarity and that such habitats (ancient woodland, blanket bog, limestone pavement, lowland fen, salt marsh and so on) need to be addressed in EIA of proposed developments. It is further noted that the Secretary of State should not grant development consent for any development that would result in the loss or deterioration of any irreplaceable habitats, including ancient woodland, and ancient and veteran trees unless there are wholly exceptional reasons.

The updated AoS concludes that updated EN-1 will likely continue to provide sufficient levels of protection to priority habitats and the habitat of priority species except in the circumstances of overriding public benefits considerations outweighing any harm.

Promote new habitat creation or restoration and linkages with existing habitats?

Updated EN-1 Part 5 continues to set out that the Secretary of State should consider what appropriate requirements should be attached to any consent and/or in any planning obligations entered into, in order to ensure that any mitigation or biodiversity net gain measures, if offered, are delivered and maintained. Any habitat creation or enhancement delivered, including

linkages with existing habitats, for compensation or biodiversity net gain should generally be maintained for a minimum period of 30 years, or for the lifetime of the project, if longer.

The updated AoS concludes that updated EN-1 will likely continue to promote new habitat creation or restoration and linkages with existing habitats.

Protect and enhance the wider green and blue infrastructure network?

Updated EN-1 continues to recognise that well designed and managed green and blue infrastructure provides multiple benefits at a range of scales. It can contribute to biodiversity recovery, sequester carbon, absorb surface water, cleanse pollutants, absorb noise and reduce high temperatures. The Green Infrastructure Framework – Principles and Standards for England can be used to consider green infrastructure in development and plan for good quality and targeted creation or improvement. EN-1 also notes that when delivering biodiversity net gain off-site, developments should do this in a manner that best contributes to the achievement of relevant wider strategic outcomes, for example by increasing habitat connectivity, enhancing other ecosystem service outcomes, or considering use of green infrastructure strategies. Note is also made that applicants should look for a holistic approach to delivering wider environmental gains and benefits through the use of nature-based solutions and Green Infrastructure.

Updated EN-1 continues to state that where green infrastructure is affected, the Secretary of State should consider imposing requirements to ensure the functionality and connectivity of the green infrastructure network is maintained in the vicinity of the development and that any necessary works are undertaken, where possible, to mitigate any adverse impact and, where appropriate, to improve that network.

Increase the resilience of biodiversity to the potential effects of climate change?

Updated EN-1 Part 5 continues to set out that the Secretary of State should have regard to the aims and goals of the government's Environment Improvement Plan and any relevant measures and targets, including statutory targets in the Environment Act or elsewhere. In Wales, regard should be made to the aims of the Nature Recovery Plan. In addition, in exercising functions in relation to Wales, the Secretary of State should act in accordance with duties placed upon public authorities, including Ministers of the Crown, by Section 6 of the Environment (Wales) Act 2016 to seek to maintain and enhance biodiversity, and in so doing promote the resilience of ecosystems, so far as consistent with the proper exercise of these functions. In doing so, the Secretary of State should also take account of the context of the challenge of climate change and the role of new energy infrastructure in addressing this: failure to address this challenge will result in significant adverse impacts to biodiversity.

The updated AoS concludes that updated EN-1 will likely continue to deliver enhanced biodiversity with increased resilience to climate change.

Reduce or avoid impacts to habitats with important roles in carbon sequestration?

Updated EN-1 Part 5 continues to set out that applicants' proposals should consider any reasonable opportunities to maximise the restoration, creation, and enhancement of wider biodiversity, and the protection and restoration of the ability of habitats to store or sequester carbon.

The updated AoS concludes that updated EN-1 will likely continue to reduce or avoid impacts to habitats with important roles in carbon sequestration.

Encourage sensitive or nature inclusive design in terrestrial and marine environments?

Updated EN-1 Part 5 continues to set out that as a general principle, development should, in line with the mitigation hierarchy, at the very least aim to avoid significant harm to biodiversity and geological conservation interests, including through mitigation and consideration of reasonable alternatives where significant harm cannot be avoided, then appropriate compensation measures should be sought. If significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then the Secretary of State will give significant weight to any residual harm. Note that the application of the approach to CNP has implications for the ultimate protection of environmental matters in certain situations – see the section on CNP for further detail and discussion. In Wales, applicants should refer to the step wise approach as set out in Planning Policy Wales (PPW).

Updated EN-1 Part 5 also continues to set out that the applicant should include appropriate avoidance, mitigation, compensation and enhancement measures as an integral part of the proposed development. In particular, the applicant should demonstrate that:

- during construction, they will seek to ensure that activities will be confined to the minimum areas required for the works
- the timing of construction has been planned to avoid or limit disturbance
- during construction and operation best practice will be followed to ensure that risk of disturbance or damage to species or habitats is minimised, including as a consequence of transport access arrangements
- habitats will, where practicable, be restored after construction works have finished
- opportunities will be taken to enhance existing habitats rather than replace them, and where practicable, create new habitats of value within the site landscaping proposals. Where habitat creation is required as mitigation, compensation, or enhancement the location and quality will be of key importance. In this regard habitat creation should be focused on areas where the most ecological and ecosystems services benefits can be realised
- mitigations required as a result of legal protection of habitats and species will be complied with.

Applicants should consider producing and implementing a Biodiversity Management Strategy as part of their development proposals. This could include provision for biodiversity awareness

training to employees and contractors so as to avoid unnecessary adverse impacts on biodiversity during the construction and operation stages.

The design of any direct cooling system the locations of the intake and outfall should be sited to avoid or minimise adverse impacts on the receiving waters, including their ecology. There should also be specific measures to minimise impact to fish and aquatic biota by entrainment and impingement or by excessive heat or biocidal chemicals from discharges to receiving waters.

Updated EN-1 Part 4 continues to add that the construction of an onshore energy project on the coast may involve, for example, dredging, dredge spoil deposition, cooling water, culvert construction, marine landing facility construction and flood and coastal protection measures which could result in direct effects on the coastline, seabed and marine ecology and biodiversity.

Additionally, indirect changes to the coastline and seabed might arise as a result of a hydrodynamic response to some of these direct changes. This could lead to localised or more widespread coastal erosion or accretion and changes to offshore features such as submerged banks and ridges, marine biodiversity and heritage assets.

The updated AoS concludes that the principles and requirements placed upon energy infrastructure development by updated EN-1 will likely continue to encourage sensitive or nature inclusive design in terrestrial and marine environments.

Ensure energy activities protect fish stocks and marine mammals & ensure energy activities do not exacerbate disturbance to bird populations?

Updated EN-1 Part 5 continues to state that the design of Energy NSIP proposals will need to consider the movement of mobile / migratory species such as birds, fish and marine and terrestrial mammals and their potential to interact with infrastructure. As energy infrastructure could occur anywhere within England and Wales, both inland and onshore and offshore, the potential to affect mobile and migratory species across the UK and more widely across Europe (transboundary effects) requires consideration, depending on the location of development.

Note that updated EN-3 continues to provide additional information in relation to the potential effect and approaches to mitigation on birds and bats from Onshore and Offshore wind farms.

On this basis, the updated AoS concludes that updated EN-1 is likely to continue to ensure that energy activities protect birds, fish and mammals.

Deliver a minimum 10% net gain in biodiversity for any new major infrastructure development?

Updated EN-1 Part 4 Environment and Biodiversity Net Gain continues to set out that Energy NSIP proposals, whether onshore or offshore, should seek opportunities to contribute to and enhance the natural environment by providing net gains for biodiversity where possible. Updated EN-1 continues to points out that currently biodiversity net gain only applies to

terrestrial and intertidal components of projects in England. Principles for Marine Net Gain are currently in development by government who will provide guidance in due course. There are provisions in the Environment Act 2021 to allow marine net gain to be made mandatory in the future.

In England, applicants for onshore elements of any development are encouraged to use the most current version of the Defra biodiversity metric to calculate their biodiversity baseline and present planned biodiversity net gain outcomes. This calculation data should be presented in full as part of their application. Where possible, this data should be shared with the Local Authority and Natural England for discussion before at the pre- application stage as it can help to highlight biodiversity and wider environmental issues which may later cause delays if not addressed. Biodiversity net gain should be applied after compliance with the mitigation hierarchy and does not change or replace existing environmental obligations.

In Wales, applicants should consider the guidance set out in section 6 of Planning Policy Wales and the relevant policies in the Wales National Marine Plan. Note that in Wales Net Benefit for Biodiversity is based on the concept that development should leave biodiversity and the resilience of ecosystems in a better state than before, through securing long-term, measurable and demonstrable benefit, primarily on or immediately adjacent to the site. It is also important to note that the Welsh National Marine Plan includes policy to ensure that biological and geological components of ecosystems are maintained, restored where needed and enhanced where possible, to increase the resilience of marine ecosystems and the benefits they provide. It encourages consideration of the inclusion of restoration and enhancement in a development project at sea and at the coast. However, there is currently no obligation upon proposers of projects in the marine environment to provide enhancement within their proposals.

Biodiversity net gain can be delivered onsite or wholly or partially off-site. Any off-site delivery of biodiversity net gain should also be set out within the application for development consent. When delivering biodiversity net gain off-site, developments should do this in a manner that best contributes to the achievement of relevant wider strategic outcomes, for example by increasing habitat connectivity or enhancing other ecosystem service outcomes, or consider use of green infrastructure strategies. Reference should be made to relevant national or local plans and strategies, such as green infrastructure strategies, Local Nature Recovery Strategies, to inform off-site biodiversity net gain delivery.

In addition to delivering biodiversity net gain, developments may also deliver wider environmental gains and benefits to communities relevant to the local area, and to national policy priorities, such as: reductions in GHG emissions; reduced flood risk; improvements to air or water quality; climate adaptation, landscape enhancement, increased access to natural greenspace, or the enhancement, expansion or provision of trees and woodlands. The scope of potential gains will be dependent on the type, scale, and location of specific projects.

Although achieving biodiversity net gain is not currently an obligation on applicants, Schedule 15 of the Environment Act contains provisions which, when commenced, mean the Secretary of State may not grant an application for Development Consent Order unless satisfied that a

biodiversity gain objective is met in relation to the onshore development in England to which the application relates. Note that the Secretary of State should give appropriate weight to environmental and biodiversity net gain, although any weight given to gains provided to meet a legal requirement (for example under the Environment Act 2021) is likely to be limited.

The biodiversity gain objective will be set out in a biodiversity gain statement (as defined under the Act). Normally these statements will be included within NPS but the Act allows for the statement to be published separately where a review of an NPS has begun before the provisions are commenced, as is the case with these energy NPS.

Under the provision of the Act, any such separate biodiversity statement will be regarded as contained within these national policy statements. The Act also contains the power to extend this requirement to offshore development.

Updated EN-1 Part 4 continues to go further by requiring applications for development consent be accompanied by a statement demonstrating how opportunities for delivering wider environmental net gains have been considered, and where appropriate, incorporated into proposals as part of good design (including any relevant operational aspects) of the project. Applicants should make use of available guidance and tools for measuring natural capital assets and ecosystem services, such as the Natural Capital Committee's 'How to Do it: natural capital workbook', Defra's guidance on Enabling a Natural Capital Approach (ENCA), and other tools that aim to enable wider benefits for people and nature. Where environmental net gain considerations have featured as part of the strategic options appraisal process to select a project, the applicants should reference that information to supplement the site-specific details.

The updated AoS concludes that any new major terrestrial and onshore energy infrastructure in England and Wales promoted by updated EN-1 will likely continue to deliver Biodiversity Net Gain and wider environmental net gains. The situation continues to be less clear with regards to marine biodiversity net gain given that such requirements have yet to become mandatory.

Prevent spread of invasive species (native and non-native), including new invasive species because of climate change?

Updated EN-1 does not directly note the need to prevent the spread of invasive species (including as a result of climate change), though it does note that the applicant should ensure (in respect of previously developed land) that the risk posed by land contamination should be considered and should set out how it is proposed that this is addressed. Where contamination is present, applicants should consider opportunities for remediation where possible. It is anticipated that such considerations would include for the risk posed by invasive species, however, for clarity and completeness, the updated AoS recommends that specific note is made in updated EN-1 of the need to prevent the spread of invasive species, including as a result of climate change.

Assessment conclusions and summary

The policies set out in updated EN-1 sections on Biodiversity Net Gain and Biodiversity and Geological Conservation (as discussed above) thoroughly address AoS Objective 2 Enhance

biodiversity, promote ecosystem resilience and functionality and contribute to the achievement of Biodiversity Net Gain and the delivery of the Nature Recovery Network.

Updated EN-1 continues to recognise that careful siting and use of appropriate technologies can help to mitigate adverse impacts on the environment and sets out an overarching principle in relation to protecting biodiversity, which is that development should at the very least aim to avoid significant harm to biodiversity interests, including through mitigation and consideration of reasonable alternatives. It is suggested that in cases where significant harm is unavoidable, then appropriate compensation measures should be sought. Where this is not possible, it is suggested that the Secretary of State gives significant weight to any residual harm. Note that the application of the approach to CNP has implications for the ultimate protection of biodiversity (and other environmental matters) in certain situations – see the section 8 on CNP for further detail and discussion.

Development proposals should seek opportunities to contribute to and enhance the natural environment by providing net gains for biodiversity where possible, and as part of good design. To aid this, updated EN-1 continues to require that the Secretary of State should maximise opportunities for biodiversity within developments, using planning obligations.

Updated EN-1 continues to state that proposals should consider and seek to provide improvements to natural capital and ecosystem services (wider environmental net gain) when considering how to achieve biodiversity net gain. This would be in keeping with the requirements of Clean Power 2030. Considerations of biodiversity in updated EN-1 also continue to recognise that the potential impacts of climate change on biodiversity mean that the two policy considerations are intrinsically linked and that the benefits of nationally significant low carbon energy infrastructure development may also yield benefits for biodiversity interests.

In terms of designations, updated EN-1 continues to note that the Secretary of State should ensure that appropriate weight is given to designated sites of international, national and local importance, protected species, habitats and other species of importance for the conservation of biodiversity. Updated EN-1 continues to suggest that development on land within or outside a SSSI which is likely to have adverse effects (either individually or in combination with other developments) should not be permitted but notes that an exception to this is possible where the benefits of the development in the location proposed clearly outweigh its impacts on the features of the site qualify it as a SSSI and impacts on the national network of SSSIs. Updated EN-1 continues to encourage the Secretary of State to use requirements and/or planning obligations to mitigate significant harm arising from the development on SSSIs and suggests that, where possible, development should enhance a site's biodiversity.

Updated EN-1 continues to note that the valuable biodiversity resources within Ancient Woodland cannot be recreated and therefore the Secretary of State should not grant consent for any developments that would result in its deterioration or loss, unless it can be demonstrated that the benefit and need of the development outweighs the loss. The same level of protection through updated EN-1 continues to be afforded to species and habitats that have been identified as being of principal importance for the conservation of biodiversity; it

would need to be demonstrated that the benefits of and need for development outweighs the harm. However, it is also noted in this context that the Secretary of State should give substantial weight to any harm to the detriment of biodiversity features of national or regional importance. Updated EN-1 continues to set that proposals should maximise opportunities to restore, create and enhance wider biodiversity, which could include consideration of Local Nature Recovery Strategies and national goals.

At the local scale, updated EN-1 continues to suggest that Local Nature Reserves and Local Wildlife Sites require due consideration, but given the need for new energy generating infrastructure, these designations should not be used as the sole reason to refuse development consent.

Given the strategic nature of the NPSs being updated (EN-1, EN-3 and EN-5), they will likely allow for a wide range of energy infrastructure development to take place in any part of England and Wales and extending offshore. As such, the updated AoS concludes that there will likely be significant negative effects in the short to long term on local and marine biodiversity as a result of development coming forward under the NPSs.

Nevertheless, across all other designations, the updated AoS continues to anticipate significant positive effects in the medium and long term, through the clear approach noted in updated EN-1 of using the mitigation hierarchy and delivering biodiversity enhancement through an obligation to deliver Biodiversity Net Gain and also Environmental Net Gain. In addition, the recent approach set out within Clean Power 2030 should provide strengthened benefits to biodiversity.

It is to be noted that the strategic nature of the NPS and this AoS means that there is a degree of uncertainty in findings -– all effects will clearly vary according to the type of impact, the specific location of the site, and the habitats and species affected.

Table 5-3: Enhance biodiversity and ecological networks, deliver biodiversity net gain, protect and support ecosystem resilience and functionality Objective Summary

AoS Objective: Enhance biodiversity and ecological networks, deliver biodiversity net gain, protect and support ecosystem resilience and functionality	**Assessment of generic effects (by timescale)**		
Guide questions:	S	M	L
• Protect and enhance nationally designated sites such as SSSIs and National Nature Reserves, Marine Conservation Zones, Marine Protection Areas and Highly Protected Marine Areas, including those of potential or candidate designation? • Protect and enhance valued habitat and populations of protected/scarce species on locally	**--**	**-- / ++**	**-- / ++**

designated sites, including Key Wildlife Sites, Local Wildlife Sites and Local Nature Reserves? • Protect the structure and function/ecosystem processes, including in the marine environment? • Protect and enhance the Nature Recovery Network? • Protect and enhance priority habitats, and the habitat of priority species? • Promote new habitat creation or restoration and linkages with existing habitats? • Protect and enhance the wider green infrastructure network? • Increase the resilience of biodiversity to the potential effects of climate change? • Reduce or avoid impacts to habitats with important roles in carbon sequestration? • Encourage sensitive or nature inclusive design in terrestrial and marine environments? • Ensure energy activities protect fish stocks and marine mammals? • Ensure energy activities do not exacerbate disturbance to bird populations? • Deliver a minimum 10% net gain in biodiversity for any new major infrastructure development? • Increase the resilience of biodiversity to the potential effects of climate change? • Prevent spread of invasive species (native and non-native), including new invasive species because of climate change?			

AoS Objective 4: Protect and enhance sites designated for their international importance for nature conservation purposes

Anticipated effects

The scope and scale of the development enabled by the NPS has the potential for a range of impacts on sites designated for their international importance for nature conservation purposes. Effects will vary depending on the type of development and its location in relation to

designated assets. Significant effects could arise as a result of development coming forward under the NPS, which could impact the qualifying features for which 'habitat sites' are designated (including Special Areas of Conservation (SAC), Special Protection Areas (SPA), and in the UK, Ramsar sites despite being designated at the international rather than European level). These potential effects and the qualifying features they could impact include:

- Air pollution - arising from emissions to air from transport to and from the site, and emissions directly from certain energy infrastructure.
    - Nutrient sensitive habitats (including soils and water) and plants, plus species they support
- Noise pollution and vibration - arising from construction, operation and decommissioning activities.
    - Bird species
    - Mammal species
    - Fish species
- Light pollution - arising from construction, operation and decommissioning activities.
    - Bat species
    - Nocturnal bird and insect species
- Change in water quality/temperature - arising from emissions to water during construction and decommissioning, and emissions directly from certain energy infrastructure.
    - Freshwater habitats (such as rivers and lakes)
    - Marine habitats
    - Wetland habitats (including groundwater dependent terrestrial ecosystems)
    - Coastal habitats (saltmarsh, sand dunes)
    - Aquatic species (freshwater, brackish and marine)
- Changes in water quantity/flow/drainage - direct loss from the abstraction of water resources, and indirect or temporary losses, for example during construction phases.
    - Freshwater habitats
    - Marine habitats
    - Wetland habitats
    - Aquatic species (freshwater, brackish and marine)
- Land contamination – arising during construction and during operation from emissions to water (including thermal impacts) and ground.
    - Terrestrial habitats and species
    - Wetland habitats and species

- Habitat loss/fragmentation - direct loss from land take or the abstraction of water resources, and indirect or temporary losses, for example during construction phases.
    - All habitats and species
- Impingement and entrainment of fish – arising from operation processes such as cooling water intake or turbines generating tidal power.
- Coastal change - arising from construction, operation and decommissioning activities.
    - Coastal habitats
    - Fish species
    - Seabird species
    - Marine mammals
- Bird/bat strike - from introduced/tall structures presenting obstacles to migration and flight paths.
- Disturbance to marine species - arising from construction, operation and decommissioning activities.
- Climate change effects on habitats and species - arising from construction, operation and decommissioning activities.
- Changes to electromagnetic fields - arising from construction, operation and decommissioning activities.
- Introduction of invasive non-native species - arising from construction, operation and decommissioning activities.

There is also potential for development to result in positive effects on habitat condition and connectivity from management, restoration and enhancements activities.

Assessment made in respect of updated EN-1

This assessment of the relevant policies and planning conditions set out in updated EN-1 has been undertaken considering each of the guide questions associated with AoS Objective 4.

Avoid the direct loss of, or indirect harm to, 'Habitats Sites' (SPAs, SACs and Ramsar sites), including those of potential designation (candidate SPAs, proposed SACs, Sites of Community Importance (SCI) and proposed Ramsar sites) and compensation sites both onshore and offshore?

There is potential for the majority of adverse effects on habitat sites as a result of energy generating infrastructure development to continue to be avoided, reduced and mitigated through careful siting, design and planning according to the provisions in updated EN-1. However, the significance of any effects remains uncertain, and the effectiveness of the mitigation possibilities proposed will depend on the individual sensitivities of the receiving sites, in the context of specific details of the energy infrastructure development's design, layout and operation.

Habitats Regulations Assessment (HRA) will determine whether individual energy infrastructure proposals have an adverse effect on the integrity of habitat sites, as recognised in updated EN-1, as they are important sites for biodiversity identified through international conventions and the Conservation of Habitats and Species Regulations 2017 (as amended) as well as the Conservation of Offshore Marine Habitats and Species Regulations 2017. In addition, updated EN-1 itself is subject to updated HRA, which is being carried out alongside this updated AoS and has informed this assessment.

Updated EN-1 continues to highlight the need for proposals to be accompanied by an Environmental Statement (ES) (under the Infrastructure Planning Regulations 2017), which describes the likely significant effects of the proposal on the environment, including specific reference to biodiversity. Through this legal requirement for an ES, it is ensured that the direct, indirect, secondary, transboundary and short to long term effects of the development on biodiversity will be considered, as these are requirements in The Regulations. Where development is subject to EIA, updated EN-1 continues to indicate that the ES should clearly set out any effects on internationally designated sites of ecological or geological conservation importance, on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity, including irreplaceable habitats. It is considered that in many instances such irreplaceable habitats may also be designated for nature conservation purposes.

Updated EN-1 continues to outline mitigation measures which are likely to reduce direct and indirect effects on habitat sites. These include limiting construction activities to the minimum area required, following best practice in terms of avoiding disturbance or damage to species or habitats, restoration of habitats following construction and enhancement of habitats where practicable. The potential for noise disturbance caused by proposed development should also be considered where proximity to designated sites may mean that noise could have an adverse impact on protected species or other wildlife. Seasonality aspects of wildlife in such designated sites should also be considered.

Updated EN-1 also continues to recognise that loss of or damage to designated sites might occur and it notes that information to allow effective consideration of this must be provided, including an assessment of alternative solutions, a case for Imperative Reasons of Overriding Public Interest (IROPI) and appropriate environmental compensation. It is noted that provision of this information will not be taken as an acceptance of adverse impacts. Consideration of compensation should be made as early as possible and close liaison with SNCB and Defra / Welsh Government should be undertaken. Before submitting an application, applicants should seek the views of the SNCB and Defra/Welsh Government as to the suitability, securability and effectiveness of the compensation plan to ensure the development will not hinder the achievement of the conservation objectives for the protected site. Note also that applicants should also engage with the relevant Local Planning Authority (anticipated to include relevant other bodies such as National Park Authorities) at an early stage regarding the proposed location of compensatory measures.

Updated EN-1 notes that the Offshore Wind Environmental Improvement Package (OWEIP) contains a commitment to introduce strategic compensatory measures for offshore renewables NSIPS, to offset environmental effects but also to reduce delays for individual projects.

The updated AoS therefore concludes that the updated NPS continues to recognise the importance of designated sites and provide a framework for their protection and avoidance of loss.

Support continued improvements to the condition status of the UK's national site network?

SACs and Special Protection Areas (SPAs) in the UK are recognised as Emerald Network sites under the Bern Convention on Wildlife. The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 have created a national site network on land and at sea, including both the inshore and offshore marine areas in the UK. The national site network includes existing SACs and SPAs and any new SACs and SPAs designated under these Regulations. Any references to Natura 2000 in the 2017 Regulations and in guidance now refers to the new national site network.

Maintaining a coherent network of protected sites with overarching conservation objectives is still required in order to fulfil the commitment made by government to maintain environmental protections and continue to meet international legal obligations, such as the Bern Convention, the Oslo and Paris Convention (OSPAR), Bonn and Ramsar Conventions.

Updated EN-1 continues to set out that Statutory Nature Conservation Bodies are responsible for monitoring and managing designated sites. It is also noted that applicants can request and agree 'Evidence Plans' with SNCBs, which is a way to agree and record upfront the information the applicant needs to supply with its application, so that the HRA can be efficiently carried out. If, during the pre-application stage, the SNCB indicate that the proposed development is likely to adversely impact the integrity of a protected site, the applicant must include with their application such information as may reasonably be required to assess a potential derogation under the Habitats Regulations.

Note is continues to be made in updated EN-1 of the need to protect Marine Conservation Zones and Marine Protected Areas. Marine Protected Area (MPA) is a term used to describe the network of habitat sites, SSSIs and MCZs (including HPMAs) in the English and Welsh marine environment. It is important that relevant guidance on managing environmental impacts of infrastructure in marine protected areas is followed, and that equal consideration of the effect of proposals should be given to all MPAs regardless of the legislation they were designated under. This is because all sites contribute to the network of MPAs and therefore to overall network integrity, and achievement of the Environment Act MPA target. For this reason, the Secretary of State should assess the impact, either alone or in combination, on all designated MPA sites when making any decision on development consent.

For the reasons outlined above, the updated AoS concludes that the updated NPS continues to provide a mechanism to support continued improvements to the condition status of the UK's national site network.

Assessment conclusions and summary

Updated EN-1 has been subject to updated HRA to determine whether the updated strategic plan poses a risk to habitat sites and whether it would result in likely significant effects, either alone, or in combination with other plans. The NPSs do not include any sites, locations or other spatial proposals and, therefore, the HRA is an assessment of the policy content only. As such it is high-level and strategic in nature and it does not constitute or take the place of a project HRA for any energy infrastructure development that may come forward under the NPSs.

Given the strategic nature of the NPSs and the lack of geographically specific proposals, they allow for a wide range of potential energy development to take place in any part of England and Wales, territorial waters and within the Renewable Energy Zone offshore. As such, it was not possible for the HRA to conclude that there will be no effects on habitat sites as a result of development coming forward under the NPSs. It was not possible to screen out likely significant effects at the screening stage, nor adverse effects on integrity at the appropriate assessment stage. A number of alternatives to the NPSs were considered, but none of the reasonable alternatives would be able to avoid the potential for adverse effects on integrity on habitat sites.

The development of a range of major generating infrastructure that is enabled through updated EN-1 continues to have the potential to result in direct adverse impacts on Habitat Sites in the short term, from the construction of developments and associated supporting infrastructure. Furthermore, it is likely that energy infrastructure development will be located in rural and/or coastal areas where the majority of Habitat Sites tend to be located. There is potential for direct and indirect effects on Habitat Sites to occur in the short and medium term, as a result of operational activities. Long term effects will be dependent on the duration that infrastructure developments are in operation, which is likely to be many decades in the case of major energy generating infrastructure. The decommissioning stage of any of the generating infrastructure also has the potential to have direct negative effects on Habitat Sites, due to soil, water and air contamination, as well as disturbance. However, positive effects may be achieved in the long term, through restoration of a decommissioned site.

The Government has concluded that, whilst energy development should seek to avoid significant adverse effects on habitat sites, there is a case for imperative reasons of overriding public interest (IROPI). This means that the NPSs can be designated, even if they could result in adverse effects on the integrity of habitat sites. Where this is the case, sufficient compensatory measures must be provided.

Therefore, there continues to be potential for significant negative effects on sites designated for their international importance and nature conservation purposes as a result of the updated plan implementation in the short, medium and long term. This could include on sites which are in the jurisdiction of other countries (transboundary). The effects identified are uncertain as they will depend on the specific locations and scale of development, which is uncertain given that the NPSs do not outline specific proposals.

Table 5-4: Protect and enhance sites designated for their international importance for nature conservation purposes Objective Summary

AoS Objective: Protect and enhance sites designated for their international importance for nature conservation purposes	**Assessment of generic effects (by timescale)**		
Guide questions: • Avoid the direct loss of, or indirect harm to, 'Habitats Sites' (SPAs, SACs and Ramsar sites), including those of potential designation (candidate SPAs, proposed SACs, Sites of Community Importance (SCI) and proposed Ramsar sites) and compensation sites both onshore and offshore? • Support continued improvements to the condition status of the UK's national site network?	S **--**	M **--**	L **--**

AoS Objective 5: Protect and enhance cultural heritage assets and their settings, and the wider historic environment

Anticipated effects

New energy related development may result in pressure on areas of importance for their cultural heritage and aesthetic quality. There is a requirement for development proposals to be carefully considered such that assets are preserved and enhanced – the NPS will need to respond to context such that preservation is pursued where appropriate, but pro-active management and redevelopment can be supported where this secures viable futures for cultural heritage resources that are currently threatened.

The construction, operation and decommissioning of energy infrastructure has the potential to result in adverse impacts on the historic environment. EN-1 defines the historic environment as including all aspects of the environment resulting from the interaction between people and places through time, including all surviving physical remains of past human activity, whether visible, buried or submerged, landscaped and planted or managed flora. It is understood that this would include offshore marine shipwrecks, or other submerged artefacts. Those elements of the historic environment that hold value to this and future generations because of their historic, archaeological, architectural or artistic interest are called ”heritage assets” (“historic assets” in Wales). Without a co-ordinated strategic approach to development and infrastructure there is an increased potential for this risk to result.

It is to be noted that some heritage assets are of a level of significance that warrants official designation e.g. World Heritage Sites, Scheduled Monuments etc., but the absence of designation does not indicate lower significance – these are subject to the same policy considerations. It is important to note that the nature of cultural heritage features means that not all are known at present; in particular, buried archaeological remains.

Enabling the development of energy infrastructure to meet the energy demands of the UK has the potential for a number of generic effects on archaeology and cultural heritage which are applicable across the different types of energy infrastructure development and which may be both direct and indirect. They include:

- Direct disturbance or loss of heritage assets during construction as a result of ground works or excavation; and
- Indirect impacts on the setting of nearby heritage assets, for example visual intrusion within a landscape or townscape context, or from noise or pollutants.

Assessment made in respect of updated EN-1

This assessment of the relevant policies and planning conditions set out in updated EN-1 has been undertaken considering each of the guide questions associated with AoS Objective 5.

Conserve and enhance designated heritage assets and their settings (World Heritage Sites, Scheduled Monuments, Listed Buildings and structures, Registered Parks and Gardens, Registered Battlefields and Conservation Areas), as well as maritime assets such as protected wrecks?

Updated EN-1 Part 5 Historic Environment continues to set out the following categories of designated heritage assets that are of concern: World Heritage Sites; Scheduled Monuments; Protected Wreck Sites; Protected Military Remains; Listed Buildings; Registered Parks and Gardens; Registered Battlefields; Conservation Areas; and Registered Historic Landscapes (Wales only).

Updated EN-1 also continues to set out that non-designated heritage assets that have been demonstrably shown to be of equivalent significance to designated heritage assets, should be considered subject to the same policy considerations as those that apply to designated heritage assets. This is expanded to note that non-designated heritage assets of archaeological interest that are demonstrably of equivalent significance to Scheduled Monuments or Protected Wreck Sites should be considered subject to the policies for designated heritage assets. Note that the absence of designation for such heritage assets does not indicate lower significance or necessarily imply that it is not of national significance. Note is also made of the importance of those assets yet to be formally assessed by the Secretary of State but which have potential to demonstrate equivalent significance to Scheduled Monuments or Protected Wreck Sites.

In determining applications, the Secretary of State should seek to identify and assess the particular significance of any heritage asset that may be affected by the proposed development, including by development affecting the setting of a heritage asset, taking account of a number of important factors as set out in EN-1 Part 5. The Secretary of State must also comply with the requirements on listed buildings, conservation areas and scheduled monuments, set out in Regulation 3 of the Infrastructure Planning (Decisions) Regulations 2010.

In considering the impact of a proposed development on any heritage assets, the Secretary of State should take into account the particular nature of the significance of the heritage assets and the value that they hold for this and future generations. This understanding should be used to avoid or minimise conflict between their conservation and any aspect of the proposal.

The Secretary of State should take into account the desirability of sustaining and, where appropriate, enhancing the significance of heritage assets, the contribution of their settings and the positive contribution that their conservation can make to sustainable communities, including to their quality of life, their economic vitality, and to the public's enjoyment of these assets. The Secretary of State should also take into account the desirability of the new development making a positive contribution to the character and local distinctiveness of the historic environment. The consideration of design should include scale, height, massing, alignment, materials, use and landscaping (for example, screen planting).

When considering the impact of a proposed development on the significance of a designated heritage asset, the Secretary of State should give great weight to the asset's conservation. The more important the asset, the greater the weight should be. This is irrespective of whether any potential harm amounts to substantial harm, total loss, or less than substantial harm to its significance.

Considerable importance and weight should be given to desirability of preserving all heritage assets. Any harm or loss of significance of a designated heritage asset (from its alteration or destruction, or from development within its setting) should require clear and convincing justification. Substantial harm to or loss of significance of a grade II Listed Building or a grade II Registered Park or Garden should be exceptional. Substantial harm to or loss of significance of assets of the highest significance, including Scheduled Monuments; Protected Wreck Sites; Registered Battlefields; grade I and II* Listed Buildings; grade I and II* Registered Parks and Gardens; and World Heritage Sites, should be wholly exceptional.

Where the proposed development will lead to substantial harm to (or total loss of significance of) a designated heritage asset the Secretary of State should refuse consent unless it can be demonstrated that the substantial harm to or loss of significance is necessary to achieve substantial public benefits that outweigh that harm or loss, or all of the following apply:

- the nature of the heritage asset prevents all reasonable uses of the site
- no viable use of the heritage asset itself can be found in the medium term through appropriate marketing that will enable its conservation

- conservation by grant-funding or some form of not for profit, charitable or public ownership is demonstrably not possible
- the harm or loss is outweighed by the benefit of bringing the site back into use

Where the proposed development will lead to less than substantial harm to the significance of the designated heritage asset, this harm should be weighed against the public benefits of the proposal, including, where appropriate securing its optimum viable use.

Updated EN-1 also continues to note that where the loss of significance of any heritage asset has been justified by the applicant on the merits of the new development and the significance of the asset in question, the Secretary of State should consider imposing a requirement in the Development Consent Order requiring the applicant to enter into an obligation that will prevent the loss occurring until the relevant part of the development has commenced, or it is reasonably certain that the relevant part of the development is to proceed.

Updated EN-1 continues to note that Heritage Coasts have been confirmed by the government as having the highest status of protection in relation to landscape and scenic beauty, the terrestrial and coastal fauna and flora and heritage features. The designation represents a specific statutory purpose in ensuring their continued protection and the Secretary of State should have regard to these in their decision. The applicant should identity any effects on the special character of Heritage Coasts. The Secretary of State may grant development consent in these areas only in exceptional circumstances.

The updated AoS therefore concludes that the updated NPS continues to recognise the importance of conserving and enhancing designated heritage assets (and equivalent non-designated heritage assets) and their setting and it sets out strong protection policy for these assets. However, when development results in substantial harm to a designated asset, the Secretary can still give consent if it can be demonstrated that the substantial harm to or loss of significance is necessary to achieve substantial public benefits that outweigh that harm or loss. Therefore, updated EN-1 will unlikely provide adequate levels of protection to designated heritage assets when overriding public benefits considerations outweigh any harm of loss.

Conserve and enhance non-designated and / or locally listed heritage assets (including newly discovered heritage assets and archaeology) and their settings?

Updated EN-1 continues to set out that the Secretary of State should also consider the impacts on other non-designated heritage assets (as identified either through the development plan making process by local authorities, including ‘local listing’, or through the application, examination and decision making process). This is on the basis of clear evidence that such heritage assets have a significance that merits consideration in that process, even though those assets are of lesser significance than designated heritage assets. In weighing applications that directly or indirectly affect non-designated heritage assets, a balanced judgement will be required having regard to the scale of any harm or loss and the significance of the heritage asset.

The updated AoS therefore finds that updated EN-1 continues to recognise the importance of non-designated and / or locally listed heritage assets upon which impacts need to be

considered. However, when development results in substantial harm to a non-designated asset, the Secretary can still give consent if it can be demonstrated that the substantial harm to or loss of significance is necessary to achieve substantial public benefits that outweigh that harm or loss. Therefore, updated EN-1 will be unlikely to provide adequate levels of protection to non-designated heritage assets when overriding public benefits considerations outweigh any harm of loss.

Avoid significant harm to heritage assets, for example from the generation of noise, pollutants and visual intrusion & Address heritage assets at risk, or protect them from further threats?

Updated EN-1 continues to set out that the applicant should ensure that the extent of the impact of the proposed development on the significance of any heritage assets affected can be adequately understood from the application and supporting documents. Studies will be required on those heritage assets affected by noise, vibration, light and indirect impacts, the extent and detail of these studies will be proportionate to the significance of the heritage asset affected.

The applicant is encouraged, where opportunities exist, to prepare proposals which can make a positive contribution to the historic environment, and to consider how their scheme takes account of the significance of heritage assets affected. This can include, where possible:

- enhancing, through a range of measures such a sensitive design, the significance of heritage assets or setting affected
- considering where required the development of archive capacity which could deliver significant public benefits
- considering how visual or noise impacts can affect heritage assets, and whether there may be opportunities to enhance access to, or interpretation, understanding and appreciation of, the heritage assets affected by the scheme

Careful consideration in preparing the scheme will be required on whether the impacts on the historic environment will be direct or indirect, temporary or permanent. It is also to be noted that where there is evidence of deliberate neglect of, or damage to, a heritage asset, the Secretary of State should not take its deteriorated state into account in any decision. It is anticipated that this would also include for consideration of the level of risk to the heritage asset.

Applicants should look for opportunities for new development within Conservation Areas and World Heritage Sites, and within the setting of heritage assets, to enhance or better reveal their significance. Proposals that preserve those elements of the setting that make a positive contribution to the asset (or which better reveal its significance) should be treated favourably.

The update AoS concludes that updated EN-1 continues to recognise that heritage assets can be harmed through a range of direct (alteration or destruction) and indirect impacts (through development within its setting) which would give rise to impacts including noise and visual intrusion.

Ensure appropriate archaeological assessment prior to development?

Updated EN-1 continues to set out a robust approach to assessment of any development applications in terms of cultural heritage. This notes that, through an EIA procedure, applicants should provide a description of the significance of the heritage assets affected by the proposed development and the contribution of their setting to that significance. The level of detail should be proportionate to the importance of the heritage assets and no more than is sufficient to understand the potential impact of the proposal on the significance of the heritage asset. Consultation with relevant statutory bodies is also required, with minimal requirements set out. It is also noted that where a development site includes, or the available evidence suggests it has the potential to include, heritage assets with an archaeological interest, the applicant should carry out appropriate desk-based assessment and, where such desk-based research is insufficient to properly assess the interest, a field evaluation. Where proposed development will affect the setting of a heritage asset, representative visualisations may be necessary to explain the impact. The applicant should ensure that the extent of the impact of the proposed development on the significance of any heritage assets affected can be adequately understood from the application and supporting documents.

Note continues to be made in updated EN-1 that where the loss of the whole or part of a heritage asset's significance is justified, the Secretary of State will require the applicant to record and advance understanding of the significance of the heritage asset before it is lost (wholly or in part). The extent of the requirement should be proportionate to the asset's importance and significance and the impact. The applicant should be required to publish this evidence and to deposit copies of the reports with the relevant Historic Environmental Record. They should also be required to deposit the archive generated in a local museum or other public repository willing to receive it.

Similarly, updated EN-1 continues to note that where there is a high probability (based on an adequate assessment) that a development site may include, as yet undiscovered heritage assets with archaeological interest, the Secretary of State will consider requirements to ensure appropriate procedures are in place for the identification and treatment of such assets discovered during construction.

The updated AoS finds that provision for appropriate archaeological assessment prior to development continues to be set out in updated EN-1.

Maintain or improve the interpretation, understanding and appreciation of the historic environment & Increase public access to heritage assets?

The updated AoS finds that updated EN-1 continues to place a sufficient requirement on the applicant to establish whether there may be opportunities to enhance access to, or interpretation, understanding and appreciation of the heritage assets affected by the scheme.

Assessment conclusions and summary

Direct effects are likely to occur in the short term during the construction of energy scheme development and associated supporting infrastructure. Indirect effects are likely to occur in the

short and medium term with long term effects dependent on infrastructure operational duration (which could be many decades) and decommissioning activities.

In areas where there is a concentration or cluster of energy infrastructure development there is also the potential for negative cumulative effects on the setting of heritage assets as well as physical impacts that ultimately may result in a change to the significance of heritage assets. The significance of these effects is highly dependent on the location and scale of development, as well as the importance and nature of heritage assets and their setting relative to energy infrastructure.

In most cases, it is anticipated that there is the potential for minor negative effects (including cumulative effects) on heritage assets (designated and non-designated) in the short, medium and long term as a result of the potential impacts on assets and their settings (with some uncertainty about the extent of direct effects such as disturbance and loss as these will be determined by location and type of any infrastructure in relation to the heritage assets). It is to be noted that some heritage assets such as shipwrecks are located offshore and may be in the legal ownership of or be of considerable historic interest to other countries (for example wrecks identified as war graves) and as such, there is a potential for trans-boundary effects. However, it is considered that all potential effects continue to be addressed through the robust approach outlined in updated EN-1.

Table 5-5: Protect and enhance cultural heritage assets and their setting and the wider historic environment Objective Summary

AoS Objective: Protect and enhance cultural heritage assets and their settings, and the wider historic environment	**Assessment of generic effects (by timescale)**		
Guide questions: • Conserve and enhance designated heritage assets and their settings (World Heritage Sites, Scheduled Monuments, Listed Buildings and structures, Registered Parks and Gardens, Registered Battlefields and Conservation Areas), as well as maritime assets such as protected wrecks? • Conserve and enhance non-designated and / or locally listed heritage assets (including newly discovered heritage assets and archaeology) and their settings? • Address heritage assets at risk, or protect them from further threats? • Avoid significant harm to heritage assets, for example from the generation of noise, pollutants and visual intrusion?	S **-**	M **-**	L **-**

• Ensure appropriate archaeological assessment prior to development? • Maintain or improve the interpretation, understanding and appreciation of the historic environment? • Increase public access to heritage assets?			

AoS Objective 6: Protect and enhance the character and quality of the landscapes, townscapes and waterscapes and protect and enhance visual amenity

Anticipated effects

The scope and scale of the development enabled by the plan has the potential for a range of landscape and visual effects which will vary according to the type of development, its location and the landscape setting of the proposed development.

Virtually all nationally significant energy infrastructure projects will have effects on the landscapes, townscapes and waterscapes and is likely to have visual effects for many receptors around proposed sites. Scape effects arise not only from the sensitivity of the scapes but also the nature and magnitude of change proposed by the development. Generic effects on scape from energy infrastructure include:

- the introduction of a range of new, industrial structures, (often of significant size and requiring substantial land take) including long term, permanent structures; and developments that are temporary in the short to medium term;
- introduction of associated outputs to industrial processes such as visible steam plumes, and
- visual effects for receptors (residents, tourists, visitors).

It is to be noted that many areas within England and Wales that could potentially host new energy infrastructure of a large scale (e.g. coastal locations), currently support a high level of local and national landscape designations. The development of a mix of generating technologies will deliver large scale and tall structures, in both existing industrial locations and in new greenfield/offshore/coastal settings. Many of these structures are likely to be in predominantly rural, remote areas, including areas of high landscape value where visual impacts will be significant. The scale and severity of those effects will depend on the energy type, its overall setting context and the specifics of the site itself. Coastal areas are particularly vulnerable to visual intrusion because of the potential high visibility of development on the foreshore, on the skyline and affecting views along stretches of undeveloped coast.

Particular effects can be experienced in those areas that are designated for their landscape value such as National Parks, the Broads and National Landscapes (formerly known as AONBs). It is to be noted that each of these areas has specific statutory purposes which help ensure their continued protection that could be adversely affected by development.

The character of the wider landscape and townscape should also be protected by ensuring that its integrity and valuable natural open space is not lost.

Opportunities for landscape enhancement should be explored, e.g. through sympathetic design and enhancements to existing landscape improvement areas, as well as new planting opportunities associated with new energy development and be in keeping with the aims of the Nature Recovery Network.

Increased energy development poses a serious risk to the special qualities of designated and other valued landscapes. Especially vulnerable are special qualities such as relative tranquillity and a sense of wildness or remoteness. As such, there is a need to protect those special qualities across many parts of England and Wales. Without a co-ordinated strategic approach to development and infrastructure degradation of the special qualities of our finest landscapes designated as National Parks (formerly known as AONBs) and National Parks may be degraded or lost.

There is also a need to respect particular landscape or townscape settings. Careful consideration should be given to design quality in both an urban and rural setting, promoting placemaking principles and seeking to inject character and distinctiveness where possible and where this enhances the sense of place. Design, where possible, should respond positively to the local characteristics, including vernacular architecture when appropriate.

Without a co-ordinated strategic approach to development and infrastructure, there is increased potential for planning decisions to lead to inappropriate development, which could produce a cumulatively damaging impact on a designated landscape or fragment existing networks of open space thereby reducing connectivity.

Assessment and recommendations made in respect of EN-1

This assessment of the relevant policies and planning conditions set out in updated EN-1 has been undertaken considering each of the guide questions associated with AoS Objective 6. Note that references in EN-1 to landscape are taken to include seascape and townscape alongside landscape where appropriate. **Avoid the development in National Parks and National Landscapes (formerly AONBs) and Support the integrity of any areas designated for landscape value, including in conjunction with the provisions of any relevant Management Plan (e.g. National Parks, National Landscapes, Heritage Coasts and local landscape designations)?**

In respect of those areas with nationally significant landscape designations, such as National Parks, the Broads, National Parks and Heritage Coasts, updated EN-1 continues to note that development consent can be granted in exceptional circumstances, having been demonstrated

to be in the public interest and with any development carried out to high environmental standards, including through the application of appropriate requirements where necessary.

Updated EN-1 continues to further note that the duty to have regard to the purposes of nationally designated areas also applies to projects outside the boundaries of the nationally designated area but which may have impacts within them. There is a requirement to avoid harming the purposes of designation to minimise adverse impacts on designated areas with sensitive design given the various siting, operational and other relevant constraints. Consideration should be made of cross boundary impacts.

The Secretary of State will be required to take into consideration the level of detailed design which the applicant has provided and is secured in the Development Consent Order (DCO), and the extent to which design details are subject to future approvals. Updated EN-1 continues to require the Secretary of State to be satisfied that local authorities will have sufficient design content secured to ensure future consenting will meet landscape, visual and good design objectives.

In relation to those areas that are not nationally designated, but which may be highly valued locally and protected by local designation, the policies within local development plans that are based on landscape or seascape / waterscape character assessment should be paid particular attention. However, locally valued landscapes should not be used in themselves to refuse consent, as this may unduly restrict acceptable development. In addition, consideration of benefits of the project (including need) would be made.

The updated AoS continues to note that the NPS should seek to conserve and enhance the natural beauty of national parks and national landscapes, which is their shared statutory purpose. For land use planning, the NPPF expresses this in terms of conserving and enhancing their ‘landscape and scenic beauty’. Particular attention should be paid to these areas designated for their landscape value. This includes their landscape and seascape settings where intrusive development can affect the designated area and delivery of its statutory purpose.

The updated AoS finds that the updated EN-1 continues to recognise the importance of supporting the integrity and upholding the statutory purpose of a designated site requiring development to be carried out to high environmental standards, including through the application of appropriate requirements where necessary.

Conserve and enhance the intrinsic character or setting of local landscapes or townscapes or waterscapes?

Updated EN-1 continues to require the applicant to consider landscape and visual matters in the early stages of siting and design, where site choices and design principles are being established. Note that developers should also consider how their design principles can be applied post-consent. This will allow the applicant to demonstrate in the ES how both negative effects have been minimised and opportunities for creating positive benefits or enhancement have been recognised. Updated EN-1, however, continues to note that the Landscape and Visual Impact Assessment must make reference to any landscape character assessment and

associated studies as a means of assessing landscape impacts relevant to the proposed project. Note continues to be made in updated EN-1 that for seascapes, applicants should consult the Seascape Character Assessment and the Marine Plan Seascape Character Assessments, and any successors to them.

Updated EN-1 continues to recognise that all projects need to be designed carefully, taking account of the potential impact on the landscape and having regard to siting, operational and other relevant constraints the aim should be to minimise harm to the landscape, providing reasonable mitigation where possible and appropriate.

Updated EN-1 continues to note that reducing the scale of a project can further help to mitigate the visual and landscape effects of a proposed project. However, reducing the scale or otherwise amending the design of a proposed energy infrastructure project may result in a significant operational constraint and reduction in function – for example, the electricity generation output. This though may (in exceptional circumstances) be warranted. Other mitigation can include within a site, elements of design, including colour and materials and landscaping schemes. Offsite mitigation can also take place, for example through filling gaps in existing tree or hedge lines – this may help to enhance landscape in local areas.

The updated AoS finds that provision for appropriate landscape and visual impact assessment prior to development and the need for careful design and mitigation continues to be set out in updated EN-1 which will help conserve and enhance the intrinsic character or setting of designated landscapes, townscapes and seascapes.

Minimise noise and light pollution from construction and operational activities on residential amenity and on sensitive locations, receptors and views & Prevent reduced tranquility / preserve tranquility?

Updated EN-1 continues to note that a landscape and visual impact assessment (including construction and operation phases) should be made and reported through an Environmental Statement and should include cumulative effects. Consideration is also to be made of light pollution effects, including on dark skies, local amenity as well as nature conservation, with specific note made that an assessment of effects should be undertaken that should demonstrate how noise and light pollution from construction and operational activities on residential amenity and on sensitive locations, receptors and views, will be minimised. Further note is made within the NPS of the need to consider and assess the impacts of dust, odour, artificial light, smoke and steam and the Secretary of State should be satisfied that all reasonable steps have been taken and will be taken to minimise any such detrimental impacts.

The updated AoS therefore concludes that the updated NPS continues to place sufficient conditions to minimise noise and light pollution form construction and operational activities. Consideration of dark skies, nature conservation and local amenity will also help preserve those areas noted for tranquility.

Conserve, protect and enhance natural environmental assets (e.g. parks and green spaces, common land, woodland / forests etc) where they contribute to landscape and townscape quality?

Updated EN-1 continues to note that consideration should be made of how landscapes can be enhanced through landscape management plans as this will help to enhance environmental assets where they contribute to landscape and townscape quality. However, it is to be recognised that due to the nature and size of potential schemes (as well as likely potential locations such as coastal areas), opportunities for mitigation will be limited and while updated EN-1 continues to set out a robust approach to addressing impacts on landscape, townscape and waterscape across the short, medium and long timeframes, the AoS continues to concludes that significant adverse effects are likely to remain.

Assessment conclusions and summary

Significant negative effects for landscape, townscape and visual receptors are likely as a result of the plan implementation in the short, medium and long term and it is to be noted that due to the size of likely Schemes, opportunities for mitigation will be limited. However, updated EN-1 sets out a robust approach to addressing impacts on landscape, townscape and seascape across those timeframes.

Table 5-6: Protect and enhance the character and quality of landscapes, townscapes and waterscapes and protect and enhance visual amenity Objective Summary

AoS Objective: Protect and enhance the character and quality of the landscapes, townscapes and waterscapes and protect and enhance visual amenity	**Assessment of generic effects (by timescale)**		
Guide questions: • Avoid the development in National Parks and National Landscapes (formerly AONBs)? • Support the integrity of any areas designated for landscape value, including in conjunction with the provisions of any relevant Management Plan (e.g. National Parks, National Landscapes, Heritage Coasts and local landscape designations)? • Conserve and enhance the intrinsic character or setting of local landscapes or townscapes or waterscapes? • Minimise noise and light pollution from construction and operational activities on residential amenity and on sensitive locations, receptors and views? • Prevent reduced tranquility / preserve tranquility? • Conserve, protect and enhance natural environmental assets (e.g. parks and green spaces, common land, woodland / forests etc)	S **--**	M **--**	L **--**

where they contribute to landscape and townscape quality?			

AoS Objective 7: Protect and enhance the water environment

Anticipated effects

The scope and scale of the development outlined by the NPS has the potential for a number of generic impacts on the water environment (groundwater, inland surface water, transitional waters, coastal and marine waters) which are applicable across the different types of energy infrastructure development. They include:

- increased demand for water leading to volume abstractions and the modification of water levels resulting in reduced surface and groundwater flow;
- increased discharges to water and atmospheric pollution associated with industrial processes, which can lead to reduced water quality;
- construction, operation and decommissioning activities can increase the risk of spills, leaks and pollution events with negative effects on water quality, human health and protected biodiversity; and
- construction activities and the associated land take can result in physical modifications to the water environment.

The development of a range of major generating infrastructure that is enabled through updated EN-1 has the potential to result in direct adverse impacts in the short term on the water environment. Impacts are likely to occur from the construction of such developments and associated supporting infrastructure. Furthermore, it is likely that energy infrastructure development will be located in rural and coastal areas on land which has a strong relationship with ground, surface, estuarine and coastal water bodies. There is potential for indirect effects on the water environment to occur in the short and medium term. Long term indirect effects will be dependent on the duration that infrastructure developments are in operation, which is likely to be many decades in the case of major generating infrastructure. The decommissioning stage of any of the generating infrastructure also has the potential to have direct negative effects on the water environment.

There is potential for negative cumulative effects on the water environment in areas where there is a concentration or cluster of energy infrastructure development. The significance of these effects will be dependent on the locations and scales of development relative to water bodies.

Assessment made in respect of updated EN-1

This assessment of the relevant policies and planning conditions set out in updated EN-1 has been undertaken considering each of the guide questions associated with AoS Objective 7.

Protect ground, surface, estuarine and coastal water quality in line with Water Framework Directive and Marine Strategy Framework requirements?

Updated EN-1 continues to recognise the risk that energy infrastructure (during construction, operation and decommissioning) could result in water bodies failing to meet objectives established under the WFD and Marine Strategy Regulations.

In relation to water quality, updated EN-1 continues to require (through the EIA process) applicants to describe existing water quality and the impacts of the proposed project on water quality, including noting any relevant existing discharges, proposed new discharges and any proposed changes to discharges.

In cases where there is potential for a project to have effects on the water environment, updated EN-1 continues to indicate that an assessment of the existing status of and potential impacts on water quality, water resources and physical characteristics of the water environment and how this might change due to the impact of climate change on rainfall patterns and consequently water availability across the water environment should be undertaken as part of an ES. Updated EN-1 also continues to indicate that ES for energy infrastructure proposals should demonstrate how proposals will minimise the use of water resources and water consumption.

Updated EN-1 also continues to recognise the impacts that energy generating infrastructure's emissions can have on water bodies in terms of causing excessive enrichment of nutrients (eutrophication) as a result of air pollution containing NOx and ammonia. Updated EN-1 continues to note that changes in algal composition cause algal blooms, which remove oxygen from the water environment that adversely impacts plants and fish. To tackle this, updated EN-1 continues to advise that where a project may have adverse impacts on air quality, the ES should describe any potential eutrophication impacts.

Despite the risks to water quality identified, there is potential for the majority of adverse effects on the water environment as a result of energy generating infrastructure development to be avoided, reduced and mitigated through careful design and planning to facilitate adherence to good pollution control practice. Furthermore, updated EN-1 continues to recommend that risks to the water environment can be reduced on sites by designated areas for storage and unloading, appropriate drainage facilities and efficient use of water. Encouragement is also made to consider protective measures to control the risk of pollution to groundwater. It is also to be noted that reference continues to be made to the use of SuDS. While these would be primarily for addressing issues related to flood risk, they also do have an important function in terms of helping to protect water quality. These systems would help to achieve the noted encouragement for applicants to manage surface water during construction by treating surface water runoff from exposed topsoil prior to discharging and to limit the discharge of suspended solids e.g. from car parks or other areas of hard standing, during operation.

However, the long term significance of these effects remains uncertain, and the effectiveness of the mitigation possibilities proposed will depend on the individual sensitivities of the

receiving sites, in the context of specific details of the development design, layout and operation.

Updated EN-1 continues to note that the Secretary of State should consider proposals to mitigate adverse effects on the water environment and any enhancement measures put for forward and whether appropriate requirements should be attached to any development consent and/or planning obligations.

The updated AoS concludes that the updated EN-1 continues to sets out an approach that is sufficient to protect water quality in all waterbody types in line with WFD and MSF.

Result in changes to groundwater distribution and flow?

Updated EN-1 continues to recognises the potential for adverse impacts on groundwater, with a potential that these waterbodies could fail to meet relevant environmental objectives. Note continues to be made that applicants should avoid locating potentially polluting activities in the most sensitive locations for groundwater, in particular Source Protection Zone 1 (SPZ) and close to nationally important drinking water supplies. Applicants should consider implementing protective measures to control the risk of pollution to groundwater, for example through the use of protective barriers.

Updated EN-1 also continues to require consideration of applicable proposed schemes through the EIA process. Note is made of the need to consider impacts on water sources, including abstraction issues and the existing physical characteristics of the water environment (including quantity and dynamics of flow) affected by the proposed project. This can be anticipated to include groundwater waterbodies.

Safeguard the availability of water resources (surface and groundwater)?

To protect water resources, updated EN-1 continues to advise the applicant should note any relevant abstraction rates, proposed new abstraction rates and proposed changes to abstraction rates, which should include any impact to mains supplies and reference to Abstraction Licensing Strategies and also demonstrate how proposals minimise the use of water resources and water consumption in the first instance. The same approach continues to be recommended by updated EN-1 for physical characteristics of water bodies including quantity and dynamics of flow. Updated EN-1 also continues to note that any impacts on water bodies protected under the Water Environment Regulations or source protection zones (SPZs) around potable groundwater abstractions should also be identifiedand that consideration should be made of how climate change could impact these elements in the future.

In addition, updated EN-1 continues to note that applicants should make early contact with the Environment Agency, Natural Resources Wales and water companies with their proposed water requirements to understand whether water is available. If insufficient water is available for abstraction the Environment Agency and Natural Resources Wales will be unable to authorise an abstraction licence. It is also noted in EN-1 that if insufficient water is available for abstraction, the applicant will need to find alternative sources of water to be able to proceed,

whether this is developing their own source or collaborating with the water industry or other water abstractors to develop a joint source.

The updated AoS concludes that updated EN-1 continues to set out an approach which is sufficient to safeguard availability of water resources (surface and groundwater).

Minimise the use of water resources / water consumption?

Updated EN-1 continues to note that the impact on local water resources can be minimised through planning and design for the efficient use of water, including water recycling. If a development needs new water infrastructure, significant supplies or impacts other water supplies, the applicant should consult with the local water company and the EA or NRW.

Protect the integrity of coastal and estuarine processes? & Protect the quality of the seabed and its sediments, and avoid significant effects on seabed morphology and sediment transport processes?

In terms of the marine environment, updated EN-1 continues to indicate that applicants for a Development Consent Order will need to take account of relevant marine plans and conduct a marine plan assessment. It is suggested that applicants refer to marine plans at an early stage to avoid less favourable locations.

Applicants also need to contact all relevant regulatory bodies. For example, they should make early contact with relevant regulators, including EA or NRW and the Marine Management Organisation (MMO), to discuss their requirements for Environmental Permits and other consents, such as marine licences. Close cooperation should take place between the Secretary of State and such bodies (in respect of ensuring that energy NSIPs are licensed in accordance with environmental legislation).

Applicants should also consult the MMO on nationally significant projects as the MMO (or NRW) will advise the Secretary of State on what conditions should apply to deemed marine licence and will determine applications in accordance with any applicable marine plans and the requirements under Part 4 of the Marine and Coastal Access Act, unless relevant considerations indicate otherwise.

Updated EN-1 also continues to recognise that in coastal environments, the delivery of energy generating infrastructure may involve construction activities that would result in direct impacts on coastal and marine habits, or indirect impacts through changes to the hydrodynamic regime of an area. As such, updated EN-1 continues to set out that applicants should undertake coastal geomorphological and sediment transfer modelling where necessary.

Note is also made that the Secretary of State will also consider the interactions of proposed projects with Shoreline Management Plans (as well as other plans such as those relating to water resources). As such, the NPS sets out that applicants are to detail through an ES, the impact of the proposed project on coastal processes and geomorphology (which would be anticipated to include sediment and seabed morphology), including by taking account of potential impacts from climate change. If the development will have an impact on coastal

processes the applicant must demonstrate how the impacts will be managed to minimise adverse impacts on other parts of the coast. Consideration also needs to be made of the implications of the proposed project on strategies for managing the coast as set out in Shoreline Management Plans (SMPs), any relevant Marine Plans and capital programmes for maintaining flood and coastal defences and Coastal Change Management Areas.

The updated AoS concludes that updated EN-1 continues to set out an approach which is sufficient to protect the integrity of coastal and estuarine processes, as well as protect seabed morphology and sediment transfer processes.

Reduce operational and accidental discharges to the water environment?

Updated EN-1 continues to note that consideration of discharges are to be described within the ES. This will note any relevant existing discharges, proposed new discharges and proposed changes to discharges and can be expected to address the issue of accidental discharge.AApplicants are encouraged to manage surface water during construction by treating surface water runoff from exposed topsoil prior to discharging and to limit the discharge of suspended solids e.g. from car parks or other areas of hard standing. Additionally, updated EN-1 continues to set out that applicants should avoid locating potentially polluting activities in the most sensitive locations for groundwater, in particular Source Protection Zone 1 (SPZ) and close to nationally important drinking water supplies.

Updated EN-1 continues to also note that applicants should consider protective measures to control the risk of pollution to groundwater, which could include the use of protective barriers. Note is also made that the risk of impacts on the water environment can be reduced through careful design to facilitate adherence to good pollution control practice. For example, designated areas for storage and unloading, with appropriate drainage facilities, should be clearly marked.

The updated AoS concludes that updated EN-1 continues to set out an approach that will act to reduce operational and accidental discharge to the water environment.

Assessment conclusions and summary

The updated AoS continues to note that updated EN-1 should seek to prevent pollution of water bodies (including surface and groundwater) both during the construction and operation of any proposed energy development. This could be achieved via the appropriate use of SuDS, green infrastructure or other appropriate measures and new approaches in infrastructure drainage design to enhance water quality and reduce pollution and flood risk. Risk to all types of water bodies (not just main rivers) is to be considered during any development design.

The updated AoS continues to note that without a coordinated approach to energy development and infrastructure there is increased potential for reduced water availability and water quality/pollution problems to result at water bodies, including contamination of drinking water, and effects on habitats.

Minor negative effects for water quality are likely to continue as a result of updated EN-1 implementation in the short term through to the long term as it will not be possible to avoid all negative effects on the water environment, given the nature of proposed developments. Across all timescales, there is potential for the measures outlined above, along with Environment Agency controls and compliance with international best practice to appropriately mitigate these risks, though some minor adverse effects will remain. The effects identified are uncertain as they will depend on the specific locations and scale of development.

Table 5-7: Protect and enhance the water environment Objective Summary

AoS Objective: Protect and enhance the water environment	**Assessment of generic effects (by timescale)**		
Guide questions: • Protect ground, surface, estuarine and coastal water quality in line with Water Framework Directive and Marine Strategy Framework requirements? • Result in changes to groundwater distribution and flow? • Safeguard the availability of water resources (surface and groundwater)? • Minimise the use of water resources / water consumption? • Protect the integrity of coastal and estuarine processes? • Reduce operational and accidental discharges to the water environment? • Protect the quality of the seabed and its sediments, and avoid significant effects on seabed morphology and sediment transport processes?	S **-**	M **-**	L **-**

AoS Objective 8: Protect and enhance air quality on a local, regional, national and international scale

Anticipated effects

Enabling the development of energy infrastructure to meet the energy demands of the UK has the potential for a number of generic adverse effects on air quality which are applicable across the different types of energy infrastructure development. They include:

- emissions generated as a result of construction activities (transport emissions from the transport of materials, resources and personnel; dust and fumes from machinery operation, excavation and drilling);
- emissions from project operation (operation of plant, transport of materials, resources and personnel); and
- emissions from plant, machinery and vehicles during the decommissioning of projects (including transport to and from site).

Assessment and recommendations made in respect of updated EN-1

This assessment of the relevant policies and planning conditions set out in updated EN-1 has been undertaken considering each of the guide questions associated with AoS Objective 8.

Minimise emissions of dust and other air pollutants that affect human health or biodiversity?

Updated EN-1 continues to note that adverse effects may occur at all stages of the project, as a result of emissions released during construction, operation, and decommissioning. Air emissions are noted to include particulate matter (for example dust) up to a diameter of ten microns (PM10) and up to a diameter of 2.5 microns (PM2.5), as well as gases such as sulphur dioxide, carbon monoxide and nitrogen oxides (NOx). The significance of effects will depend upon local site-specific factors, such as transport routes and proximity to sensitive receptors and it is anticipated these will be dealt with during the project level EIA.

Updated EN-1 continues to recognise that proximity to emission sources can have significant impacts on sensitive receptor sites for air quality, such as education or healthcare sites, residential use or sensitive or protected ecosystems. Projects near a sensitive receptor site for air quality should only be proposed in exceptional circumstances if no viable alternative site is available. In these instances, substantial mitigation of any expected emissions will be required.

Updated EN-1 continues to requirethe Secretary of State to consider whether mitigation measures are needed both for operational and construction emissions over and above any which may form part of the project application. A construction management plan may help codify mitigation at this stage. Updated EN-1 continues to further note that mitigations on traffic and transport impacts will help mitigate the effects of air emissions from transport.

In addition, updated EN-1 continues to note that during construction, operation and decommissioning of energy infrastructure there is potential for the release of a range of emissions such as odour, dust, steam, smoke, artificial light and infestation of insects. All have the potential to have a detrimental impact on amenity or cause a common law nuisance or statutory nuisance under Part III, Environmental Protection Act 1990. There is a requirement that such emissions are assessed and mitigation measures applied, with all reasonable steps taken to minimise detrimental impacts. Updated EN-1 continues to recognise that for energy NSIPs of the type covered by this NPS, some impact on amenity for local communities is likely

to be unavoidable. The aim should be to keep impacts to a minimum, and at a level that is acceptable.

The updated AoS concludes that updated EN-1 continues to make commitments to minimise emissions released during all stages of the project.

Improve air quality within AQMAs and avoid the need for new AQMAs?

Updated EN-1 continues to identify that applicants will be required to undertake an assessment of impacts of the proposed project on air quality as part of the Environmental Statement, describing any significant air emissions. Updated EN-1 continues to note that substantial weight should be given to air quality where a project would lead to a deterioration in an area where national air quality limits, targets or statutory air quality objectives are breached, and air quality considerations will also be important where substantial changes in air quality are expected, even if this does not lead to any breaches of national air quality limits, or statutory air quality objectives or targets.

Updated EN-1 also continues to note that the levels for pollutants in ambient air are set out in the Air Quality Standards Regulations 2010 and reiterated in the Air Quality Strategy or for Wales, the Air Quality (Wales) Regulations 2000 and the Clean Air Plan for and that two fine particulate matter (PM2.5) targets were set under the Environment Act 2021 for England – an annual mean concentration target and a population exposure target.

The Secretary of State should give air quality considerations substantial weight where a project is proposed near a sensitive receptor site such as an education or healthcare facility, residential use or a sensitive or protected habitat. Where a project is proposed in close proximity to a sensitive receptor or air quality, if justification cannot be provided for that location and a suitable mitigation plan proposed, consent should be refused.

Where a proposed development is likely to lead to a breach of the air quality thresholds or affect the ability of a non-compliant area to achieve compliance within the timescales set out in the most recent relevant air quality plan / strategy at the time of the decision, the applicant should work with the relevant authorities to secure appropriate mitigation measures to ensure that those thresholds are not breached.

The Secretary of State should consider whether mitigation measures are needed both for operational and construction emissions over and above any which may form part of the project application. The measures outlined for transport and traffic impacts in EN-1 will also help to mitigate the effects of air emissions from transport.

The updated AoS therefore concludes that updated EN-1 continues to recognise the importance of improving air quality within AQMAs and the need to avoid new AQMAs.

Promote enhancements to green infrastructure networks to help improve air quality?

Updated EN-1 continues to note the need for provision and enhancement of green infrastructure and it is recognised that this can contribute to cleansing of pollutants. Applicants

are encouraged to consider how new green infrastructure can be provided, or how existing green infrastructure can be enhanced, as part of their application.

The updated AoS finds that updated EN-1 continues to recognise the importance of enhancing green infrastructure networks to improve air quality.

Assessment conclusions and summary

While updated EN-1 continues to promote a robust approach to managing effects on air quality, effects on air quality arestill expected to slightly adverse, due to the potential for emissions of air pollutants at all stages of the project.

Table 5-8: Protect and enhance air quality on a local, regional, national and international scale Objective Summary

AoS Objective: Protect and enhance air quality on a local, regional, national and international scale	**Assessment of generic effects (by timescale)**		
Guide questions:	S	M	L
• Minimise emissions of dust and other air pollutants that affect human health or biodiversity? • Improve air quality within AQMAs and avoid the need for new AQMAs? • Promote enhancements to green infrastructure networks to help improve air quality?	-	-	-

AoS Objective 9: Protect soil resources, promote use of brownfield land and avoid land contamination

Anticipated effects

Soils are an essential natural capital, performing a range of important ecosystem services and functions. Changing precipitation patterns due to climate change will require soils to provide additional resilience to flooding and this will demand appropriate management and land use. Measures should be taken to avoid land take /loss of BMV land and to protect soil generally through avoidance of impacts such as contamination, loss, mixing, compaction or sealing of soils.

Soils and agricultural land are effectively finite in amount and declining in extent so land take is an important consideration. Whilst mitigation against the permanent loss of BMV land is extremely difficult, minimising the loss, securing the beneficial re-use of the displaced soils,

and suitable management of remaining soils (through the Defra Construction code of Practice for the Sustainable Use of Soils on Construction Sites), can help mitigate the loss or damage of the finite soil resource.

Enabling the development of energy infrastructure to meet the energy demands of the UK has the potential for a number of generic effects on soil and geology, which are applicable across the different types of energy infrastructure development. They include:

- Disturbance or loss of soils (including best and most versatile agricultural land) and geologically important sites.
- Increased risk of pollution and potential contamination of soils.
- Opportunities to remediate areas of contamination or to purposefully re-use areas or previously developed land

Assessment made in respect of updated EN-1

This assessment of the relevant policies and planning conditions set out in updated EN-1 has been undertaken considering each of the guide questions associated with AoS Objective 9.

Assist in facilitating the re-use of previously developed land?

Updated EN-1 continues to suggest that whilst using previously developed land for new development can reduce impacts on the countryside and undeveloped greenfield land in terms of land take, it may not be a viable option for many forms of energy infrastructure. Updated EN-1 does, however, continue to recognise that careful siting and use of appropriate technologies can help to mitigate adverse impacts on the environment. Applicants are required to demonstrate how the design process was conducted and how it evolved. Where several different designs were considered, the applicant should explain why the favoured choice was selected. EN-1 notes that, whilst it is not possible to mitigate the direct effects of an energy project on the existing use of site, applicants should seek to minimise these effects and effects near the site by the application of good design principles and protection of soils during construction.

The updated AoS notes that updated EN-1 continues to recognise the beneficial impacts of utilising previously developed land for new development but it also continues to acknowledge challenges with this approach for many forms of energy infrastructure. Nevertheless, careful site selection and use of appropriate technologies to help mitigate adverse impacts on the environment are noted and the applicant will be expected to justify design decisions with the protection of soils in mind.

Avoid development upon the best and most versatile agricultural land?

Updated EN-1 continues to set out that the applicant should seek to minimise impacts on the best and most versatile agricultural land (grades 1, 2 and 3a of the Agricultural Land Classification) and should seek to use land in areas of poorer quality (grades 3b, 4 and 5). In

terms of Secretary of State decision making it is noted that the Secretary of State should ensure that applicants do not site their scheme on the best and most versatile agricultural land without justification. Where schemes are to be sited on best and most versatile agricultural land the Secretary of State should take into account the economic and other benefits of that land. Where development of agricultural land is demonstrated to be necessary, areas of poorer quality land should be preferred to those of a higher quality.

The updated AoS therefore concludes that updated EN-1 provides a degree of protection to Best and Most Versatile agricultural land.

Ensure the protection of soil resources and avoid soil health degradation through sustainable soil management and re-use?

There is potential for the majority of adverse effects on soil resources as a result of energy generating infrastructure development to be avoided, reduced and mitigated through careful design and planning. However, the long term significance of these effects remains uncertain, and the effectiveness of the mitigation possibilities proposed will depend on the individual sensitivities of the receiving sites, in the context of specific details of the development design, layout and operation. In terms of mitigating impacts on soil resources, updated EN-1 continues to require applicants to identify any effects on soil health and protect and improve soil quality, seek to minimise them, and take account any mitigation measures proposed. Updated EN-1 also continues to encourage applicants to develop and implement a Soil Management Plan as part of energy infrastructure proposals and this would also likely help to minimise potential land contamination. It is also noted that the sustainable reuse of soils needs to be carefully considered in line with good practice guidance where large quantities of soils are surplus to requirements or are affected by contamination.

The updated AoS therefore concludes thatupdated EN-1 continues to recognise the importance of soil resources and encourages applicants to develop and implement a Soil Management Plan and other mitigation measures to reduce effects on soil quality and resource.

Seek to remediate contaminated land?

For developments on previously developed land, updated EN-1 continues to require that applicants should ensure that they have considered the risk posed by land contamination and how it is proposed to address this. Consideration should also be made of opportunities for remediation where possible and it is important to do this as early as possible as part of the engagement with relevant bodies before the official pre-application stage. Note also continues to be made in updated EN-1 that where pre-existing land contamination is being considered within a development, the objective is to ensure that the site is suitable for its intended use. Risks would require consideration in accordance with the contaminated land statutory guidance as a minimum.

The updated AoS therefore concludes thatupdated EN-1 continues to require consideration of the risk of contaminated land and to recognise the opportunity major new energy infrastructure projects have in remediating contaminated land where development is proposed on previously

developed land, though it may only result in remediating land to a level of contamination acceptable for its intended use.

Minimise development (hardstanding) footprint to reduce soil sealing?

Updated EN-1 continues to note that opportunities should be taken to lower flood risk by reducing the built footprint of previously developed sites and using SuDS. The use of SuDS is encouraged throughout the NPS and while there are a number of different types of SuDS, a key element to these are that they generally reduce the amount of hardstanding / soil sealing (allowing water to soak into the soil and reduce runoff rates).

Assessment conclusions and summary

Direct, short term effects on soil resources, through loss or contamination, are likely to occur from the construction of developments for energy generation and associated infrastructure, especially given that such developments will often be located on greenfield land. There is potential for contamination of soil resources to occur in the short to long term as a result of air and water pollution arising from construction or the operations of energy generating infrastructure or potentially as a result of spills during the operation of such developments. The decommissioning stage of energy generating infrastructure may also cause direct negative effects on soil resources due to spills and contaminated waste left on-site, but also offer potential for the remediation of land. Similarly, delivery of energy generating infrastructure on previously developed land may create opportunities to deliver local regeneration. Cumulative negative effects on soil resources may occur where there is a cluster or concentration of energy infrastructure development, particularly power stations. The significance of any effects will be dependent on the locations and scales of development.

Minor negative effects on soil resources are likely as a result of the plan implementation in the short, medium and long term due to the potential for loss of agricultural land and contamination of soil, potentially from spills of oil or chemicals used in the construction, operations and decommissioning of energy infrastructure. The effects identified are uncertain as they will depend on the specific nature, location and scale of development.

The mitigation and approach outlined in updated EN-1 has the potential to ensure that energy generating development enabled through updated EN-1 will avoid the best and most versatile agricultural land, where possible. Additionally, the requirement that development should not be given consent unless they have been considered by relevant pollution authorities is likely to minimise the potential for land contamination.

Table 5-9: Protect soil resources, promote use of brownfield land and avoid land contamination Objective Summary

AoS Objective: Protect soil resources, promote use of brownfield land and avoid land contamination	**Assessment of generic effects (by timescale)**		
Guide questions:	S	M	L
	-	**-**	**-**

• Assist in facilitating the re-use of previously developed land? • Avoid development upon the best and most versatile agricultural land? • Ensure the protection of soil resources and avoid soil health degradation through sustainable soil management and re-use? • Seek to remediate contaminated land? • Minimise development (hardstanding) footprint to reduce soil sealing?			

AoS Objective 10: Protect, enhance and promote geodiversity

Anticipated effects

The scope and scale of development enabled by the plan has the potential for a range of effects on geodiversity, which will vary depending on the type of energy generating development and its location in relation to geodiversity assets. These include:

- Disturbance or loss of geologically important sites – direct loss from land take, loss of seabed and indirect or temporary losses during construction phase.
- Changes to coastal and marine processes – through physical changes to coastline and marine environment (including flood management features), dredging, water abstraction and water discharge. This could result in direct loss of exposed features, as well as changes in erosion and sediment transportation.
- Obstructions – from introduced structures presenting obstacles to access and study geodiversity assets

The NPS presents an opportunity to develop strategic principles designed to control pollution, promote the re-use of previously developed land and tackle some of the causes of climate change, all of which should help to afford protection to the geodiversity resource.

Assessment made in respect of updated EN-1

This assessment of the relevant policies and planning conditions set out in updated EN-1 has been undertaken considering each of the guide questions associated with AoS Objective 10.

Protect and enhance geodiversity resource?

Updated EN-1 continues to set out an overarching principle in relation to geological conservation interests, which is that development should at the very least aim to avoid significant harm to geological conservation interests, including through mitigation and

consideration of reasonable alternatives. It is suggested that in cases where significant harm is unavoidable, then appropriate compensation measures should be sought. Where this is not possible, it is noted that the Secretary of State will give significant weight to any residual harm and consent may be refused.

Updated EN-1 continues to ensure that any proposals for energy generating infrastructure are subject to robust consideration by requiring that they are accompanied by an Environmental Statement (ES) (under the Infrastructure Planning Regulations 2017), which describes the significant likely effects of the proposal on the environment. Updated EN-1 continues to clearly note that there is a requirement that the ES sets out any effects on designated sites of geological conservation importance (including those outside England). Through this requirement, updated EN-1 continues to ensure that the direct, indirect, secondary, transboundary and short to long term effects of the development on the environment will be considered, as these are requirements in the EIA Regulations. In locations where energy generating infrastructure will be delivered in close proximity to geodiversity assets, the above requirements are likely to outline any potential impacts to their status and potential mitigation measures. A Geodiversity Management Strategy, as continues to be proposed in updated EN-1 would also help to preserve and enhance the geodiversity resource.

Updated EN-1 recognises that, in coastal environments, the delivery of energy generating infrastructure may involve construction activities that would result in direct impacts on coastal environments and indirect impacts through changes to the hydrodynamic regime of an area. As such, updated EN-1 continues to set out that applicants should undertake coastal geomorphological and sediment transfer modelling where necessary

There is potential for the majority of adverse effects on geodiversity as a result of energy generating infrastructure development to be avoided, reduced and mitigated through careful siting, design and planning. However, the significance of any effects on geodiversity remains uncertain, and the effectiveness of the mitigation possibilities proposed will depend on the individual sensitivities of the receiving sites, in the context of specific details of the development design, layout and operation.

The updated AoS concludes that updated EN-1 continues to provide an approach that will help to protect and enhance the geodiversity resource, though this will be on a case by case basis.

Protect or enhance SSSIs designated for their geological interest?

Updated EN-1 continues to note that the Secretary of State should ensure that appropriate weight is given to designated sites of international, national and local importance for the conservation of geological interest. In particular, updated EN-1continues to highlight that Sites of Specific Scientific Interests (SSSIs) should be given a high degree of protection. Updated EN-1 continues to suggest that development on land within or outside a SSSI which is likely to have adverse effects (either individually or in combination with other developments) should not normally be permitted. Updated EN-1 continues to note that an exception to this is possible where the benefits (including need) of the development in the location proposed clearly outweigh its impacts on the features of the site that qualify it as a SSSI and any broader

impacts on the national on the national network of SSSIs. Furthermore, updated EN-1 continues to encourage the Secretary of State to use requirements and/or planning obligations to mitigate significant harm arising from the development on SSSIs and that, where possible, development should ensure the conservation and enhancement of the site's geological interest.

The updated AoS concludes that updated EN-1 continues to provide an approach that will help to protect and enhance SSSI's designated for geological interest.

Avoid the degradation and removal, wherever possible, of RIGS?

At the regional and local scale, which includes Regionally Important Geological Sites and Local Geological Sites, updated EN-1 continues to indicate that due consideration should be given to such sites, but given the need for new nationally significant infrastructure, these designations should not be used in themselves to refuse development consent. Updated EN-1 also continues to ask applicants to produce and implement a Geodiversity Management Strategy with an aim that these strategies will also preserve and enhance access to geological interest features as part of relevant development proposals. Updated EN-1 continues to recognise that careful siting and use of appropriate technologies can help to mitigate adverse impacts on the environment. Applicants are required to demonstrate how the design process was conducted and how it evolved. Where several different designs were considered, the applicant should explain why the favoured choice was selected. This may offer scope for avoidance and mitigation of impacts on geodiversity assets at the design stage.

The updated AoS concludes that updated EN-1 continues to provide an approach to help avoid degradation and removal of RIGS, though it recognises that this will not always be possible.

Protect geodiversity on the shoreline and marine waters?

Updated EN-1 continues to note that coastal change means physical change to the shoreline and where onshore infrastructure projects are proposed, coastal change is to be a key consideration, noting that energy infrastructure can act as a driver of change. It notes there is a need to ensure that developments are resilient to ongoing and potential future coastal change. Updated EN-1 continues to set out that where relevant, applicants should undertake coastal geomorphological and sediment transfer modelling and help identify relevant mitigating or compensatory measures – in particular the impact of a proposed project on coastal processes and geomorphology should be considered.

Updated EN-1 also continues to note the role of Shoreline Management Plans in helping to manage coastal processes and notes that the Secretary of State should not normally consent new development in areas of dynamic shorelines where the proposal could inhibit sediment flow or have an adverse impact on coastal processes at other locations. Impacts on coastal processes must be managed to minimise adverse impacts on other parts of the coast and this would act to help protect geodiversity, though the Secretary of State may grant consent when satisfied that the benefits (including need) of the development outweigh adverse impacts. Further note continues to bemade that the Secretary of State should ensure that applicants have restoration plans for areas of foreshore disturbed by direct works and will undertake pre-

and post-construction coastal monitoring arrangements with defined triggers for intervention and restoration. The Secretary of State should also examine the broader context of coastal protection around the proposed site, and the influence in both directions, i.e. coast on site, and site on coast.

Note that offshore effects of renewable energy projects on coastal geomorphology are addressed in updated EN-3.

Support access to, interpretation and understanding of geodiversity?

Further to any mitigation outlined, updated EN-1 continues to askthe Secretary of State to maximise opportunities (using planning obligations) for building in beneficial geological features as part of good design. Updated EN-1 also sets outs the applicant to ensure construction of developments should be confined to the minimum areas required for the works andthat to further minimise any adverse impacts on geodiversity, where appropriate applicants are encouraged to produce and implement a Geodiversity Management Strategy to preserve and enhance access to geological interest features, as part of relevant development proposals.

The updated AoS concludes that updated EN-1 continues to provide an approach that can help support access to, interpretation and understanding of geodiversity.

Assessment conclusions and summary

The updated AoS has identified that there is potential for negative effects on geodiversity due toupdated EN-1 implementation in the short, medium and long term, through loss of land / seabed, changes to coastal processes etc., particularly during construction. However, due to the potential for enhancement of geological features outlined above, there is also potential for minor positive effects in the medium to long term. The effects identified are uncertain as they will depend on the specific location, nature, design and scale of development.

Table 5-10: Protect, enhance and promote geodiversity Objective Summary

AoS Objective: Protect, enhance and promote geodiversity	**Assessment of generic effects (by timescale)**		
Guide questions: • Protect and enhance geodiversity resource? • Protect or enhance SSSIs designated for their geological interest? • Avoid the degradation and removal, wherever possible, of RIGS? • Protect geodiversity on the shoreline and marine waters? • Support access to, interpretation and understanding of geodiversity?	S **-**	M **-/+**	L **-/+**

AoS Objective 11: Improve health and well-being and safety for all citizens and reduce inequalities in health

Anticipated effects

Energy production and distribution has the potential to impact on the health and well-being of the population; potential generic effects of energy infrastructure projects implementation include:

- positive effects resulting from security and affordability of supply, and potential enhancements to employment and economic opportunities;
- potential significant negative impacts from energy production and supply, in particular during construction phases (including dust, noise, odour, vibration, artificial light, exposure to pollutants, smoke and steam, waste products and an increase in pest incidence); and
- indirect negative impacts through loss of amenity, access, including access to open spaces/transport networks, changes (increases) to local populations placing pressure on essential services.

Assessment made in respect of updated EN-1

This assessment of the relevant policies and planning conditions set out in updated EN-1 has been undertaken considering each of the guide questions associated with AoS Objective 11.

Protect the health of communities through prevention of accidental pollutant discharges, exposure to electric and magnetic fields, shadow flicker or radiation?

Updated EN-1 continues to note that where a proposed energy infrastructure project has an effect on human beings, an Environmental Statement should be undertaken that should assess these effects for each element of the project, identifying any potential adverse health impacts, and identifying measures to avoid, reduce or compensate for these impacts as appropriate. This would include all elements such as increased traffic, air or water pollution, dust, odour, hazardous waste and substances, noise, exposure to radiation, and would be anticipated to include EMF and shadow flicker etc. Consideration should also be made of how the impacts of more than one development may affect people simultaneously, so the applicant should consider the cumulative impact on health in the ES where appropriate.

The updated AoS concludes that protection of community health will continue to be enabled by the approach set out in updated EN-1.

Minimise nuisance on communities and their facilities including, noise, artificial light, odour, dust, steam, smoke and infestation of insects?

Updated EN-1 continues to recognise that those areas of energy infrastructure which are most likely to have a significantly detrimental impact on health are subject to separate regulation (for example for air pollution) which will constitute effective mitigation of them, so that it is unlikely that health concerns will either by themselves constitute a reason to refuse consent or require specific mitigation under the Planning Act 2008. However, not all potential sources of health impacts will be mitigated in this way and the Secretary of State will want to take account of health concerns when setting requirements relating to a range of impacts such as noise. Updated EN-1 continues to note that opportunities should be taken to mitigate indirect impacts, by promoting local improvements to encourage health and wellbeing.

Updated EN-1 continues to set out the need to identify any potential adverse health impacts and reflect and address the potential for health effects across the whole of society and the different groups within it and recognises the need to protect the most vulnerable. Updated EN-1 also continues to reflect that not all health impacts will be addressed through separate regulation and notes the need for opportunities to be taken to mitigate indirect impacts, by promoting local improvements to encourage health and wellbeing, this includes potential impacts on vulnerable groups (including those noted with protected characteristics under the Equality Act 2010) within society i.e. those groups within society which may be differentially impacted by a development compared to wider society as a whole.

Updated EN-1 also continues to recognise the potential for dust, odour, artificial light, smoke, steam and insect infestation to cause detrimental impact on amenity or cause a common law nuisance or statutory nuisance under Part III, Environmental Protection Act 1990. Applicants are required to carry out assessment of such nuisance and that all reasonable steps have been taken, and will be taken, to minimise any such detrimental impacts. Sensitive receptors are to be identified. It is also advised that consultation takes place with local planning authorities and where appropriate, the EA about the scope and methodology of the assessment.

In addition, updated EN-1 recognises that excessive noise can have wide-ranging impacts on the quality of human life, health such as annoyance, sleep disturbance,cardiovascular disease and mental health. It can also have an effect on the environment and use and enjoyment of areas of value such as quiet places and areas with high landscape quality. Updated EN-1 continues to note the Noise Policy Statement for England and that the Welsh Government’s overarching policy is set out in its Noise and Soundscape Action Plan. Its focus is on creating appropriate soundscapes for communities. This includes not only managing noise but also considering what sounds are appropriate in a given time and place. A range of mitigation measures relating to noise are also provided within the updated NPS.

The updated AoS concludes that updated EN-1 continues to provide an approach that will help minimise nuisance on communities from a range of pollution types.

Provide for facilities that can promote more social interaction and a more active lifestyle and enjoyment of the countryside and coasts? & Result in loss of recreational and amenity land or loss of access?

Updated EN-1 continues to recognise that there is a risk to open space, countryside and coasts due to the need to locate infrastructure in these locations and that new energy infrastructure may also affect the composition, size and proximity of the local population, and in doing so have indirect health impacts, for example if it in some way affects access to key public services, transport or the use of open space for recreation and physical activity. Updated EN-1 also continues to recognise that there is a potential for impact on community facilities through an influx of workers to an area, along with a potential risk to social cohesion.

However, these issues continue to be addressed throughout updated EN-1 which notes, for example, that it is government's policy is to ensure there is 'good design' and adequate provision of high quality open space (including green infrastructure) and sports and recreation facilities to meet the needs of local communities. Open spaces, sports and recreational facilities all help to underpin people's quality of life and have a vital role to play in promoting healthy living. Well designed and managed green infrastructure in particular, provides multiple benefits at a range of scales. It can contribute to health, wellbeing, biodiversity recovery, absorb surface water, cleanse pollutants and absorb noise and reduce high temperatures. It will also play an increasingly important role in mitigating or adapting to the impacts of climate change. The provision and enhancement of green infrastructure can improve air quality, particularly in urban areas. Applicants are therefore encouraged to consider how new green infrastructure can be provided, or how existing green infrastructure can be enhanced, as part of their application. Note is also made that applicants will need to consult the local community on proposals to build on existing open space, sports or recreational buildings and land. Taking account of the consultations, applicants should consider providing new or additional open space including green and blue infrastructure, sport or recreation facilities, to substitute for any losses as a result of their proposal. Note that when considering proposals for green infrastructure, applicants should refer to the Green Infrastructure Framework. Applicants should use any up-to-date local authority assessment or, if there is none, provide an independent assessment to show whether the existing open space, sports and recreational buildings and land is surplus to requirements.

The updated AoS concludes that updated EN-1 continues to provide an approach that will help to promote more social interaction and active lifestyles. Recognition is made of the importance of community and recreational facilities and the need for their continued provision.

Promote initiatives that enhance safety and personal security for all?

It is to be noted that updated EN-1 continues to provide further clarity on pollution control as well as the role of safety legislation and notes how this can help to protect health. Further consideration is made within relevant discrete sections with particular direct relevance to health, such as air quality or noise and vibration, as well as indirect relevance such as green space that can help promote healthy living.

Updated EN-1 also continues to recognise that national security considerations apply across all national infrastructure sectors. DESNZ works closely with Government security agencies including the National Protective Security Authority (NPSA) and the National Cyber Security Centre (NCSC) to provide advice to the most critical infrastructure assets on terrorism and

other national security threats, as well as on risk mitigation. In the UK's civil nuclear industry, security is also independently regulated by the Office for Nuclear Regulation (ONR). It is also Government policy is to ensure that, where possible, proportionate protective security measures are designed into new infrastructure projects at an early stage in the project development.

Updated EN-1 continues to note that DESNZ will be notified at pre-application stage about every likely future application for energy NSIPs, so that any national security implications can be identified. Where national security implications have been identified, it is noted that the applicant should consult with relevant security experts from NPSA, ONR (for civil nuclear) and/or DESNZ to ensure security measures have been adequately considered in the design process and that adequate consideration has been given to the management of security risks.

The updated AoS concludes that updated EN-1 continues to provide an approach that will help ensure safety and personal security.

Assessment conclusions and summary

Reliable energy supplies nationally will contribute to positive effects generally on the economy and skills with indirect positive effects for health and well-being in the medium to longer term through helping to secure affordable supplies of energy and minimising fuel poverty. Opportunities for employment (across the short, medium and long term) are also likely, with consequent beneficial effects on wellbeing.

Updated EN-1 also continues to make clear recognition of the need to identify potential adverse health impacts, including on vulnerable groups (or those with protected characteristics) within society and notes that opportunities should be taken to mitigate direct impacts by promoting local improvements to encourage health and wellbeing. Beneficial effects will likely be from the short through to the long term.

Table 5-11: Improve health and wellbeing and safety for all citizens and reduce inequalities in health Objective Summary

AoS Objective: Improve health and well-being and safety for all citizens and reduce inequalities in health	**Assessment of generic effects (by timescale)**		
Guide questions: • Protect the health of communities through prevention of accidental pollutant discharges, exposure to electric and magnetic fields, shadow flicker or radiation? • Minimise nuisance on communities and their facilities including, noise, artificial light, odour, dust, steam and infestation of insects? • Result in loss of recreational and amenity land or loss of access?	S	M	L
	+	**+**	**+**

• Provide for facilities that can promote more social interaction and a more active lifestyle and enjoyment of the countryside and coasts? • Promote initiatives that enhance safety and personal security for all?			

AoS Objective 12: Promote sustainable transport and minimise detrimental impacts on strategic transport network and disruption to basic services and infrastructure

Anticipated effects

Enabling the development of energy infrastructure to meet the energy demands of the UK has the potential for a number of generic effects on traffic and transport which are applicable across the different types of energy infrastructure development. They include:

- disruption to road and public transport services, cycleways and footpaths, especially during construction;
- increased traffic leading to congestion and increased journey times;
- increased noise and atmospheric emissions from road transport;
- impacts on aviation through interfering with the operation of radars and radio signals; and
- potential positive effects through new road facilities and transport links, upgrading of existing roads, enhanced public transport. This could include new sustainable transport modes.

There is a role for the NPS in promoting infrastructure provision in a co-ordinated and pro-active manner, delivering the means to catalyse, rather than react to demands for growth.

The NPS should seek to ensure that energy development provides opportunities for utilisation of electric vehicles, as well as access to more sustainable transport modes.

Assessment made in respect of updated EN-1

This assessment of the relevant policies and planning conditions set out in updated EN-1 has been undertaken considering each of the guide questions associated with AoS Objective 12.

Prevent adverse changes to strategic transport infrastructure road/rail/airport?

Updated EN-1 continues to note that if a project is likely to have significant transport implications, the applicant's ES should include a transport appraisal, using the methodology stipulated in DfT's Transport Analysis Guidance (TAG) and Welsh Governments WelTAG. National Highways and Highways Authorities are statutory consultees on NSIP applications including energy infrastructure where it is expected to affect the strategic road network and / or

have an impact on the local road network. Updated EN-1 also continues to note that applicants should consult with National Highways and Highways Authorities as appropriate on the assessment and Mitigation to inform the application to be submitted.

Updated EN-1 also continues to note that where mitigation is required, possible demand management measures must be considered and if feasible and operationally reasonable, required, before considering requirements for the provision of new inland transport infrastructure to deal with remaining transport impacts.

The updated AoS concludes that provision for appropriate transport assessment prior to development continues to be set out in updated EN-1 which will prevent adverse changes to strategic transport infrastructure.

Prevent loss or disruption to basic services and infrastructure (e.g. telecommunications, electricity, gas)?

Updated EN-1 continues to note that a transport assessment should also consider any possible disruption to services and infrastructure (such as road, rail and airports). Further clarity is also provided in relation to water borne transport and notes that Developers should consider the DfT policy guidance “Water Preferred Policy Guidelines for the movement of abnormal indivisible loads” when preparing their application.

Where appropriate, the applicant should prepare a travel plan including demand management measures to mitigate transport impacts. The applicant should also provide details of proposed measures to improve access by active, public and shared transport, to reduce the need for parking associated with the proposal and to mitigate transport impacts.

Updated EN-1 continues to further note that there may be requirements to a consent where there is likely to be substantial HGV traffic that:

- control numbers of HGV movements to and from the site in a specified period during its construction and possibly on the routing of such movements;
- make sufficient provision for HGV parking, either on the site or at dedicated facilities elsewhere, to avoid ‘overspill’ parking on public roads, prolonged queuing on approach roads and uncontrolled on-street HGV parking in normal operating conditions; and
- ensure satisfactory arrangements for reasonably foreseeable abnormal disruption, in consultation with network providers and the responsible police force.

The updated AoS concludes that updated EN-1 continues to recognise the importance of preventing loss or disruption to basic services and infrastructure. Note this is also further explored in updated EN-1 in relation to flood risk.

Promote transportation of goods and people by low / zero carbon transport modes?

Updated EN-1 continues to note that all stages of the project should support and encourage a modal shift of freight from road to more environmentally sustainable alternatives, such as rail, cargo bike, maritime and inland waterways, as well as making appropriate provision for and

infrastructure needed to support the use of alternative fuels including charging for electric vehicles.

Updated EN-1 further continues to note, that where appropriate, the applicant should prepare a travel plan including demand management measures to mitigate transport impacts. The applicant should also provide details of proposed measures to improve access by active, public and shared transport, to reduce the need for parking associated with the proposal and to mitigate transport impacts.

The updated AoS finds that updated EN-1 continues to make commitments to promote transportation of goods and people by low/zero carbon transport modes.

Assessment conclusions and summary

Updated EN-1 continues to provide for a robust approach to promoting sustainable transport, as well as minimising detrimental impacts on the strategic transport network and disruption to services and infrastructure. It also describes the need to promote sustainable transport modes (including water borne transport, as well as improving access by active, public and shared transport), as well as to reduce the need for parking. As such, it is anticipated that uncertain effects may be experienced in the short (construction) term but with benefits experienced across the later timescale of the development.

Table 5-12: Promote sustainable transport and minimise detrimental impacts on strategic transport network and disruption to basic services and infrastructure Objective Summary

AoS Objective: Promote sustainable transport and minimise detrimental impacts on strategic transport network and disruption to basic services and infrastructure	**Assessment of generic effects (by timescale)**		
Guide questions: • Prevent adverse changes to strategic transport infrastructure road/rail/airport? • Prevent loss or disruption to basic services and infrastructure (e.g. telecommunications, electricity, gas)? • Promote transportation of goods and people by low/zero carbon transport modes?	S	M	L
	-	**+**	**+**

AoS Objective 13: To promote a strong economy with opportunities for local communities

Anticipated effects

Businesses and jobs rely on the use of energy, with economic output and associated jobs dependent on a robust and reliable system. A robust and reliable system also has important implications for consumers, as well as protecting the fuel poor, providing opportunities to save money on bills, giving warmer, more comfortable homes and balancing investment against bill impacts.

In addition, it is anticipated that the construction, operation and decommissioning of energy infrastructure can be expected to have socio-economic effects at local and regional levels e.g. due to an influx of large numbers of workers during construction phase that can lead to stress on local housing and labour markets (particularly in more rural areas / smaller towns).

Without a strategic approach to energy development the required development and associated infrastructure is less likely to be provided to encourage investment in areas where highest numbers of residents can benefit from new employment opportunities.

The pattern of deprivation across England and Wales is geographically complex, incorporating stark contrasts between wealthy and severely deprived communities. Without the strategic approach to energy development, opportunities to deliver development and infrastructure which can improve equitable and inclusive access to employment and increases in income of local people are less likely to be achieved.

Both England and Wales (along with the UK as a whole) are expected to see population growth in the coming years, with the proportion of residents of an older age. This growth will be uneven across the country, with a focus on larger urban areas most likely in relation to population growth (though the move to home working may have implications for smaller towns, villages and rural areas). Smaller villages and rural areas may experience an increasingly older demographic (as would less deprived areas), though, there would likely be regional variations.

Assessment made in respect of updated EN-1

This assessment of the relevant policies and planning conditions set out in updated EN-1 has been undertaken considering each of the guide questions associated with AoS Objective 13.

Support enhanced security, reliability and affordability of the national energy supply?

Clear recognition continues to be made within updated EN-1 of the need for a secure, reliable and affordable national energy system and it is explicitly recognised that given the vital role of energy to economic prosperity and social well-being, it is important that supplies of energy remain secure, reliable and affordable as transition is made to Net Zero. Updated EN-1 also continues to recognise that provision of energy infrastructure may have socio-economic impacts at local or regional levels. To address this, updated EN-1 continues to note that applicants and local authorities are strongly encouraged to engage during early stages of

project development so that the applicant can gain a better understanding of local or regional issues and opportunities.

The updated AoS concludes thatupdated EN-1 continues to recognise the importance of a secure and affordable energy supply in relation to the economy and opportunities for local people.

Support creation of both temporary and permanent jobs and increase skills, particularly in areas of need? & Have wider socio-economic effects such as changes to the demographics, community services or house prices?

Updated EN-1 continues to note that applicants are encouraged, where possible, to demonstrate that local suppliers have been considered in the supply chain. There is also potential need for consideration noted to include requirement for the approval by the local authority of an employment and skills plan detailing arrangements to promote local employment and skills development opportunities. This would include for the provision of apprenticeships, education and engagement with local schools and colleges and training programmes. Further consideration would be made of any relevant positive provisions the developer has made or is proposing to make to mitigate impacts (for example through planning obligations) and any legacy benefits that may arise as well as any options for phasing development in relation to the socio-economic impacts.

In addition, updated EN-1 continues to state that applicants should also consider developing accommodation strategies where appropriate, especially during construction and decommissioning phases, that would include for the need to provide temporary accommodation for construction workers if required. This could help increase the skills base in local areas.

While not explicitly stated, it is anticipated that through updated EN-1 continuing to set out that applicants for new energy infrastructure should describe the existing socio-economic conditions in the areas surrounding the proposed development and should also refer to how the development's socio-economic impacts correlate with local planning policies. This would include consideration of demographics, community services and house prices. Consideration should also be made of how impacts can be wider and cross cutting in nature, with the example of impacts on landscape potentially affecting the tourism industry.

In addition, updated EN-1 also continues to note the consideration should be made through an Environmental Statement of:

- the creation of jobs and training opportunities. Applicants may wish to provide information on the sustainability of the jobs created, including where they will help to develop the skills needed for the UK's transition to Net Zero;
- the contribution to the development of low-carbon industries at the local and regional level as well as nationally;
- the provision of additional local services and improvements to local infrastructure, including the provision of educational and visitor facilities;

- any indirect beneficial impacts for the region hosting the infrastructure, in particular in relation to use of local support services and supply chains;
- effects (positive and negative) on tourism and other users of the area impacted;
- the impact of a changing influx of workers during the different construction, operation and decommissioning phases of the energy infrastructure. This could change the local population dynamics and could alter the demand for services and facilities in the settlements nearest to the construction work (including community facilities and physical infrastructure such as energy, water, transport and waste). There could also be effects on social cohesion depending on how populations and service provision change as a result of the development; and
- cumulative effects – if development consent were to be granted to for a number of projects within a region and these were developed in a similar timeframe, there could be some short-term negative effects, for example a potential shortage of construction workers to meet the needs of other industries and major projects within the region.

The updated AoS concludes that updated EN-1 continues to support the need for the creation of jobs and increasing skills, as well as consideration of the wider socio-economic effects of development.

Delivery of infrastructure to support economic investment in the local economy?

Updated EN-1 continues to set out how delivery of energy infrastructure is of national importance, though this will be delivered on a local basis. While precise effects are subject to particular local circumstances, it can be anticipated that elements associated with energy infrastructure such as new access roads could also help to deliver or support economic investment on a local basis.

Training opportunities, or the provision of skilled jobs, in local areas can also be anticipated to help support investment by other businesses to that local area.

In addition, it continues to be noted in updated EN-1 that the UK is committed to transitioning to a circular economy, a future where resources are kept in use for longer, and waste is reduced and that as the path to net zero accelerates, there will be investment in critical infrastructure and green jobs and this will help economic prosperity.

Assessment conclusions and summary

Development of new energy infrastructure will support the security, reliability and affordability of the national energy supply and lead to the provision of jobs in local areas to the development and further afield. Some of these jobs are likely to be specialist in nature, but others will be lower skilled, or suitable for apprenticeships or will provide opportunities to further develop skills. It is anticipated that most jobs would be during the construction phase, with significantly fewer jobs during operation and then an increase during any decommissioning phase.

As noted though, a significant increase in workers can lead to stress on local housing and labour markets (particularly in more rural areas / smaller towns), however, updated EN-1 continues to set out a clear approach to addressing such issues. As such, some slight adverse effects are anticipated in the short term, but overall, there should be significant benefits in local areas during construction, with ongoing benefits through the medium to long term.

It is also important to note that updated EN-1 will continue to help to provide a robust and secure national supply of energy. This will have significant benefits across the wider economy, through for example allowing people and businesses to make long term investment decisions and could be expected to provide significant benefits through to the long term.

Table 5-13: To promote a strong economy with opportunities for local communities Objective Summary

AoS Objective: To promote a strong economy with opportunities for local communities	**Assessment of generic effects (by timescale)**		
Guide questions: • Support enhanced security, reliability and affordability of the national energy supply? • Support creation of both temporary and permanent jobs and increase skills, particularly in areas of need? • Have wider socio-economic effects such as changes to the demographics, community services or house prices? • Delivery of infrastructure to support economic investment in the local economy?	S	M	L
	-/++	**++**	**++**

AoS Objective 14: Promote sustainable use of resources and natural assets

Anticipated effects

All large infrastructure projects will require the use of natural resources (potentially of very significant quantities and including from virgin sources) and are likely to generate hazardous and non-hazardous waste (particularly during the construction phase, but also to a lesser degree during operation and decommissioning).

Reducing the need for virgin construction materials, e.g. through encouraging the use of recycled or secondary materials will not only reduce consumption but will also reduce the need to transport construction materials to site and to transport construction waste off site.

It is also to be noted that soil resources are a finite resource and there is a potential that these are considered a waste product of development sites.

Assessment made in respect of updated EN-1

This assessment of the relevant policies and planning conditions set out in updated EN-1 has been undertaken considering each of the guide questions associated with AoS Objective 14.

Reduce consumption of materials, energy and resources?

Updated EN-1 continues to note criteria for 'Good Design' for energy infrastructure and this sets out that applying 'Good Design' to energy projects should produce sustainable infrastructure efficient in the use of natural resources and energy used in their construction and operation. It is also noted that given the benefits of "good design" in mitigating the adverse impacts of a project, applicants should consider how "good design" principles can be applied to a project during the early stages of the project lifecycle.

Applicants are also encouraged to use construction best practices in relation to storing materials in an adequate and protected place on site to prevent waste or degeneration of valuable materials, for example, from accidental damage or excessive weathering. Encouragement is also made to prepare a materials management plan. The use of Building Information Management tools (or similar) to record the materials used in construction can help to reduce waste and realise further value in future decommissioning of facilities, by identifying materials that can be recycled or reused.

The updated AoS concludes that the approach set out in updated EN-1 will continue to help ensure that consumption of materials, energy and resources is reduced. This will also help to realise further value in future decommissioning of facilities.

Promote sustainable waste management practices in line with the waste hierarchy, Encourage the use of recycled and / or secondary materials, & Encourage the development of a circular economy?

Updated EN-1 continues to note that sustainable waste management is implemented through the "waste hierarchy", which sets out the priorities that must be applied when managing waste. Disposal of waste should only be considered where other waste management options are not available or where it is the best overall environmental outcome.

Updated EN-1 continues to note that applicants must ensure that all proposals align with circular economy objectives. In Wales, applicants are encouraged to refer to 'Towards Zero Waste: Our Strategy for Wales'. Applicants must demonstrate that development proposals in England are in line with Defra's policy statement on the role of EfW in treating residual waste. In England new EfW developments will only be consented where these facilitate the diversion of waste from landfill or replace an older, less efficient facility and meet the other criteria set by government. Note that the Welsh Government has put in place a moratorium on all new EfW plants greater than 10MW generation capacity in Wales. Updated EN-1 also continues to clearly note that development proposals must not compete with greater waste prevention, re-

use or recycling. Applicants should set out how they intend to ensure that recyclable materials, including those that may be recyclable in the future, will be separated and sent for appropriate treatment. In accordance with the waste hierarchy, updated EN-1 continues notes that recyclable material must not be combusted or disposed of in landfill.

Note is also made in EN-1 that where possible, projects should include the reuse of materials and use of sustainable materials such as timber, or recycled materials.

Updated EN-1 also continues to require that all applicants should set out the arrangements that are proposed for managing any waste produced and prepare a report that sets out the sustainable management of waste and use of resources throughout any relevant demolition, excavation and construction activities. The arrangements described and a report setting out the sustainable management of waste and use of resources should include information on how re-use and recycling will be maximised in addition to the proposed waste recovery and disposal system for all waste generated by the development. They should also include an assessment of the impact of the waste arising from development on the capacity of waste management facilities to deal with other waste arising in the area for at least five years of operation.

If the applicant's assessment includes dredged material, the assessment should also include other uses of such material before disposal to sea, for example through re-use in the construction process.

As such, consideration will also be made in the application process by the Secretary of State as to the effectiveness of proposed waste management systems, including ensuring that the waste arisings will not have an adverse effect on waste management facilities to deal with other waste arisings in the area. Consideration will also be given to the 'Circular Economy' and the Secretary of State should also be satisfied that all waste will be properly managed and that adequate steps have been taken to minimise volume of waste arisings and disposal. It is also noted that the Secretary of State may wish to include a condition on revision of waste management plans at reasonable intervals when giving consent.

Importantly, updated EN-1 continues to set out that the Secretary of State should not grant consent to a residual waste treatment facility where they are not convinced that the proposals will support the diversion of non-recyclable waste for landfill or replace an older, less efficient facility. The Secretary of State should also be satisfied that any proposed residual waste treatment facility is feasible for the duration of its proposed lifecycle in light of declining residual waste volumes and will not be reliant on material that is recyclable.

The updated AoS concludes that updated EN-1 continues to promote sustainable waste management practices in line with the waste hierarchy.

Promote the use of low carbon materials and technologies?

The updated EN-1 continues to note that where possible, applicants are encouraged to source materials from recycled or reused sources and use low carbon materials, sustainable sources

and local suppliers. In a wider context, note is also made in the updated EN-1 of using innovative low carbon technologies, energy efficiency measures and so on.

Produce waste by-products that require appropriate management?

Updated EN-1 continues tonote that Government policy on hazardous and non-hazardous waste is intended to protect human health and the environment by producing less waste and by using it as a resource wherever possible. Where this is not possible, waste management regulation ensures that waste is disposed of in a way that is least damaging to the environment and to human health. In England, the EA's Environmental Permitting regime incorporates operational waste management requirements for certain activities. When an applicant applies to the EA for an Environmental Permit, the EA will require the application to demonstrate that processes are in place to meet all relevant Environmental Permit requirements. In Wales, NRW carries out this duty.

Reference also continues to be made to environmental regulatory regimes and in certain circumstances this would apply to waste management.

The updated AoS concludes that updated EN-1 continues to provide an approach to help ensure the appropriate and safe management of wastes.

Promote the use of local suppliers that use sustainably-sourced and locally produced materials?

Updated EN-1 continues to note that applicants must ensure that all proposals align with circular economy objectives and the government's circular economy ambitions. It is anticipated by the AoS that a mature circular economy would have sustainably sourced and locally produced materials at its core. Note is also made that applicants are encouraged, where possible, to demonstrate that local suppliers have been considered in the supply chain. In addition, applicants are also encouraged to source materials from recycled or reused sources and use low carbon materials, sustainable sources and local suppliers. Note is also made that that where possible, projects should include the reuse of materials and use of sustainable materials such as timber.

Assessment conclusions and summary

Updated EN-1 continues to provide a robust approach to promoting sustainable use of resources and natural assets and notes how good design can reduce the requirement for consumption of materials and applying this to a project at as early a stage as possible will act to reduce consumption. Clear note continues to be made of a number of key aspects such as the waste hierarchy, and the requirement to set out the arrangements that are proposed for managing any waste produced, as well as ensuring proposals align with circular economy objectives. While there will be a high level of consumption of sources in the short term (construction phases), including virgin material, this will reduce during the operational phase and techniques such as the use of Building Information Management tools (or similar) will

provide opportunities in the long term for realising the recovery and reuse of materials used at the construction stage.

It is also considered that updated EN-1 continues to help reduce the consumption of fossil fuels by the economy by helping to promote a shift to more sustainable forms of energy generation (including potentially using waste as a source of energy where it cannot be recycled or reused) and transport such as active modes like cycling and walking, as well as Low and Zero Emission Vehicles by helping to provide / enable the appropriate infrastructure in new development areas.

Table 5-14: Promote sustainable use of resources and natural assets Objective Summary

AoS Objective: Promote sustainable use of resources and natural assets	**Assessment of generic effects (by timescale)**		
Guide questions:	S	M	L
• Reduce consumption of materials, energy and resources? • Promote sustainable waste management practices in line with the waste hierarchy? • Encourage the use of recycled and / or secondary materials? • Encourage the development of a circular economy? • Promote the use of low carbon materials and technologies? • Produce waste by-products that require appropriate management? • Promote the use of local suppliers that use sustainably-sourced and locally produced materials?	**-**	**0**	**0/+**

Assessment of Alternatives

Introduction

The Environmental Assessment of Plans and Programmes Regulations 2004 ("the SEA Regulations") require that when an environmental report on a proposed plan or programme is prepared, it must identify, describe and evaluate the likely significant effects of implementing reasonable alternatives to the plan or programme which it assesses, as well as the likely significant effects of the plan or programme itself. The analysis of reasonable alternatives is to take into account "the objectives and the geographical scope of the plan".

In line with the principles of good policy making and with the requirements of the SEA legislation, reasonable alternatives for implementing the aims of the NPS have been considered.

This section of AoS-1 is concerned with the analysis of reasonable alternatives. The analysis of reasonable alternatives provides a strategic context for the detailed assessment of the likely significant effects of updated EN-1, as well as a means of evaluating it by comparing it with other ways of achieving the same wider energy policy objectives through the planning regime – both in terms of their comparative merits as ways of achieving those objectives and in terms of their environmental, social and economic impacts.

Four potential reasonable strategic alternatives that appear capable of fulfilling the objectives of updated EN-1 (as outlined in Section 5) have then been tested against the AoS objectives. As noted in Section 2, the 14 AoS objectives have been grouped into 6 more appropriate headline sustainable development themes for the purpose of the alternatives assessment as set out in Table 5-14.

The preferred policy approach as set out in updated EN-1 is appraised in detail using the updated AoS framework of objectives in Section 5 of this report.

In addition to the overarching policies presented in updated EN-1, more detailed requirements for specific energy technologies are set out in updated EN-3 and EN-5. The framework for considering consents for new energy infrastructure projects comprises updated EN-1 and where relevant one or more of the technology-specific NPSs. The formulation of technology-specific alternatives is discussed further and assessed in the relevant technology-specific AoSs, provided in Sections 6 to 7 in this report.

Table 5-14: Sustainable Development (SD) Themes and AoS Objectives

Theme	AoS Objective
Climate Change	Net Zero (1)
Security of Energy Supply	Health (11), Economy (13)
Health & Well- Being	Air Quality (8), Health (11)
The Economy	Health (11), Economy (13), Resources (14)

The Built Environment	Transport (12), Heritage (5), Adaptation and Resilience (2)
The Natural Environment	Adaptation and Resilience (2), Biodiversity (3 & 4), Landscapes and Townscapes (6), Water (7), Soils (9), Geodiversity (10)

Alternatives Considered for AoS of updated EN-1

The NPSs set a strategic framework within which it is for industry to propose new energy infrastructure projects. The reasonable alternatives that have been formulated to inform the development of the previous iteration of EN-1 were based on the fundamental premise that a combination of technologies, not one single technology, will be required to deliver secure and affordable supplies of energy which are compatible with net zero and protect the environment. Such approach remains valid for considering alternatives to updated EN-1 and after reconsideration of each alternative it has been concluded that these remain appropriate in the context of the material changes made to updated EN-1 as set out in Section 1. Table 5-15 summarises updated EN-1 and the three alternatives that have been considered.. It is important to note that all of the Alternatives are variations of updated EN-1 but are differentiated by the removal or restriction of specific technologies.

Table 5-15: Plan and Alternatives considered for updated EN-1

	Description
EN-1	Updated EN-1 combines Renewables (including Solar, Onshore and Offshore Wind, Biomass and Energy from Waste with CCS), Natural Gas-fired electricity generation with or without CCS, Hydrogen-fired electricity generation, Pumped Hydro Storage, Nuclear, associated electricity network infrastructure, and natural gas, oil, hydrogen and CCS infrastructure.
Alternative 1 (A1)	As updated EN-1 without Nuclear and Unabated Natural Gas.
Alternative 2 (A2)	As updated EN-1 without Unabated Natural Gas.
Alternative 3 (A3)	As updated EN-1 without Nuclear.

Note that in consideration of Alternatives, the assessment is undertaken in comparison to updated EN-1 and as such, the findings of the AoS in respect of updated EN-1 in Section 5 broadly apply to all of the alternatives – the key differentiator being the inclusion or absence of specific technologies and the relative outcomes of such inclusion or absence. In order to draw comparison between the Alternatives on a broad level, the following scale has been used:

Table 5-16: Differentiator Scale for Alternatives

Scale	**Description**
Large Positive	A materially different positive outcome is anticipated compared to updated EN-1
Positive	A more positive outcome is anticipated compared to updated EN-1

Neutral	This alternative is anticipated to have the same outcome as updated EN-1
Negative	A more adverse outcome is anticipated compared to updated EN-1
Large Negative	A materially different adverse outcome is anticipated compared to updated EN-1

Appraisal of Alternatives

The findings of the appraisal of the strategic alternatives for updated EN-1 are set out below, arranged by Sustainable Development (SD) theme. As noted, consideration of the Alternatives is in comparison to the updated EN-1 and not to each other alternative.

Climate Change (Net Zero)

Alternative A1 – As updated EN-1 without Nuclear and Unabated Natural Gas

By focusing solely on a combination of Renewables, Natural Gas with CCS, Hydrogen and Energy Storage technologies, Alternative A1 has the potential to deliver materially different positive, cumulative effects in the medium to long term than updated EN-1. These technologies will produce very low carbon intensity energy contributing significantly to emissions reduction and the Net Zero target.

Alternative A2 – As updated EN-1 without Unabated Natural Gas

Alternative A2 adds Nuclear energy to the technology mix for Alternative A1. Nuclear power stations provide continuous, reliable, power and produce no direct carbon emissions during operation. Nuclear, alongside other technologies could also offer broader system benefits, such as clean hydrogen production or low carbon heat. In comparison to updated EN-1, this alternative does not include unabated gas, which therefore is materially beneficial for emissions reduction and the achievement of Net Zero.

Alternative A3 – As updated EN-1 without Nuclear

Alternative A3 adds Unabated Natural Gas Technologies to the technology mix for alternative A1 which could be used as mid merit plant (adjusting its power output as demand for electricity fluctuates throughout the day) or as dispatchable peak capacity.

Allowing unabated generation without balancing emissions out of the atmosphere has adverse effects on emissions reduction and the achievement of Net Zero. Emissions to the atmosphere will continue either until such point CCS is installed in power stations or for as long as mid merit and peak unabated power stations operate.

Direct Air Carbon Capture (DACC) technologies are challenging due to the low concentration of carbon dioxide in the air (as compared to capturing carbon dioxide at point sources, such as at industrial facilities and thermal power stations) and the technology itself requires a lot of energy. Due to these challenges, DAC technologies may not be available until CCS infrastructure is available to allow the storage of the carbon dioxide (and thus negative emissions), or until carbon utilisation markets are available and economic. This may result in

unnecessary accumulation of emissions in the atmosphere until such time DAC technologies are fully available.

In comparison to updated EN-1, this alternative does not include Nuclear, which may lead to greater reliance on unabated gas technology and negative emission technologies, such as Direct Air Carbon Capture and Storage.

Headline SD themes	Updated EN-1	Alternative A1	Alternative A2	Alternative A3
Climate Change (Net Zero)		Large Positive	Large Positive	Negative

Security of Energy Supply

Alternative A1 – As updated EN-1 without Nuclear and Unabated Natural Gas

The effect of this alternative on the security of energy supply will depend to a large extent on whether a mix of Renewables, Natural Gas with CCS, Hydrogen and Energy Storage technologies can provide safe and secure energy supplies. As the timing of availability of Hydrogen and Energy Storage at scale is currently uncertain, reliance of such technologies could have a materially adverse effect on security of supply in the short to medium term, than that of updated EN-1.

Alternative A2 – As updated EN-1 without Unabated Natural Gas

The inclusion of Nuclear in this alternative (in comparison to the technology mix in alternative A1) allows for a continuous and reliable technology which would enhance security of supply as it would lead to less reliance on technologies still under development such as Hydrogen and Energy Storage. In comparison to updated EN-1, this alternative does not have Unabated Natural Gas, so there could potentially be issues surrounding peak capacity.

Alternative A3 – As updated EN-1 without Nuclear

In this alternative, Unabated Natural Gas technologies would have the role of enhancing security of supply through providing reliable peak capacity as well as providing a baseline of continuous reliable security of supply of electricity and placing less reliance on technologies still under development, such as Hydrogen and Energy Storage. However, this alternative would still be reliant on a smaller range of generating technologies with adverse impacts on security of supply compared to updated EN-1.

Headline SD themes	Updated EN-1	Alternative A1	Alternative A2	Alternative A3
Security of Energy Supply		Large Negative	Negative	Negative

Health and Well-being

Alternative A1 – As updated EN-1 without Nuclear and Unabated Natural Gas

As with updated EN-1, Alternative A1 has the potential to result in significant indirect positive effects for health and well-being because of improved employment opportunities and the predicted, enhanced economic conditions arising from investment in energy infrastructure. These positive effects have the potential to be cumulative in the long term from improved vibrancy in the energy industry sector.

Alternative A2 – As updated EN-1 without Unabated Natural Gas

As with updated EN-1 and Alternative A1, Alternative A2 has the potential to result in significant indirect positive effects for health and well-being because of improved employment opportunities and the predicted, enhanced economic conditions arising from investment in energy infrastructure. These positive effects have the potential to be cumulative in the long term from improved vibrancy in the energy industry sector.

Alternative A3 – As updated EN-1 without Nuclear

As with EN-1 and the other two Alternatives, Alternative A3 has the potential to result in significant indirect positive effects for health and well-being because of improved employment opportunities and the predicted, enhanced economic conditions arising from investment in energy infrastructure. These positive effects have the potential to be cumulative in the long term from improved vibrancy in the energy industry sector.

Headline SD themes	Updated EN-1	Alternative A1	Alternative A2	Alternative A3
Health & Well-being		Neutral	Neutral	Neutral

The Economy

Alternative A1 – As updated EN-1 without Nuclear and Unabated Natural Gas

Alternative A1 provides for a range of low carbon energy sources to meet the UK's future energy needs. Short to medium term positive effects are likely to be significant for the economy and employment across the range of technology types during construction and operation phases given the scale of development required/proposed. These benefits should accrue at local and regional levels and there may be positive cumulative effects nationally for the energy and associated sectors overall, from increased investment in infrastructure.

There is a potential for minor negative effects in the short to medium term where the impacts arising from new energy infrastructure are detrimental to existing industries (e.g. tourism, through a loss of amenity/negative landscape impacts/lower property values, and agriculture/fisheries/shipping through direct impacts on natural resources from direct land loss or windfarm exclusion zones).

Similar to updated EN-1, the overall long term impacts for Alternative A1 are assessed as positive for the economy as plan implementation will support the creation of jobs and skills development across the energy sector.

Alternative A2 – As updated EN-1 without Unabated Natural Gas

Alternative A2 provides for a range of low carbon energy sources to meet the UK's future energy needs. Short to medium term positive effects are likely to be significant for the economy and employment across the range of technology types during construction and operation phases given the scale of development required/proposed. These benefits should accrue at local and regional levels and there may be positive cumulative effects nationally for the energy and associated sectors overall, from increased investment in infrastructure.

There is a potential for minor negative effects in the short to medium term where the impacts arising from new energy infrastructure are detrimental to existing industries (e.g. tourism, through a loss of amenity/negative landscape impacts/lower property values, and agriculture/fisheries/shipping through direct impacts on natural resources from direct land loss or windfarm exclusion zones). The overall long term impacts for Alternative A2 are assessed as positive for the economy as plan implementation will support the creation of jobs and skills development across the energy sector.

It is to be noted that this Alternative, as with updated EN-1 does also include Nuclear technologies and while all the Alternatives will bring benefits to the local economies, due to the longer construction and operation periods for nuclear projects, these impacts (both positive and negative) may be longer lasting. It is anticipated that any negative impacts during construction, for example, a large influx of workers (often to a rural area) that can disrupt local employment and housing markets, can be mitigated to a great extent by industry developers.

Similar to updated EN-1, the overall long term impacts for Alternative A2 are assessed as positive for the economy as plan implementation will support the creation of jobs and skills development across the energy sector.

Alternative A3 – As updated EN-1 without Nuclear

Alternative A3 provides for a range of low carbon energy sources to meet the UK's future energy needs. As with updated EN-1, short to medium term positive effects are likely to be significant for the economy and employment across the range of technology types during construction and operation phases given the scale of development required/proposed. These benefits should accrue at local and regional levels and there may be positive cumulative effects nationally for the energy and associated sectors overall, from increased investment in infrastructure.

There is a potential for minor negative effects in the short to medium term where the impacts arising from new energy infrastructure are detrimental to existing industries (e.g. tourism, through a loss of amenity/negative landscape impacts/lower property values, and agriculture/fisheries/shipping through direct impacts on natural resources from direct land loss or windfarm exclusion zones). The overall long term impacts for Alternative A3 are assessed

as positive for the economy as plan implementation will support the creation of jobs and skills development across the energy sector.

Similar to updated EN-1, the overall long term impacts for Alternative A3 are assessed as positive for the economy as plan implementation will support the creation of jobs and skills development across the energy sector.

Headline SD themes	Updated EN-1	Alternative A1	Alternative A2	Alternative A3
The Economy		Neutral	Neutral	Neutral

The Built Environment

Alternative A1 – As updated EN-1 without Nuclear and Unabated Natural Gas

Renewable technologies tend to involve more extensive land use than thermal power plants of equivalent capacity although Natural Gas with CCS technology also may require extra land for the installation of CCS. This means that with more emphasis on renewable energy in this alternative, in comparison to updated EN-1, there may be negative effects on attributes such as built heritage due to the additional land area affected.

However, effects to and from flood risk on the built environment would be attenuated due to less need for energy technologies that tend to locate near to coasts, estuaries or rivers (such as nuclear) due to their water resource needs.

Potentially more abated natural gas with CCS in this alternative is likely to result in a greater clustering of generating capacity proposals around preferred locations as the closer a power station is to a viable route to transport and store CO2, the lower the costs of retrofitting CCS to that power station could be. As such there is the potential for more cumulative local negative effects on the built environment.

Alternative A2 – As updated EN-1 without Unabated Natural Gas

As per updated EN-1, results in more emphasis on Nuclear in this alternative, could give rise to infrastructure clustering in areas where there are existing skills in the workforce and ancillary infrastructure such as transport connections.

This alternative does not have Unabated Natural Gas, unlike updated EN-1 and as such may require more overall land take compared to updated EN-1, due to the potential requirement of additional land for CCS.

Nuclear also results in a more efficient use of land as more energy can be generated per unit of land area. Compared to Solar Renewables, the need for land area can be significantly lower for the same energy output potentially resulting in less direct potential impact on the built environment. However, effects to and from flood risk to the built environment could be heightened due to preferential location of nuclear and natural gas power stations near to coasts, estuaries or rivers to satisfy water resource needs for cooling.

Inclusion of only Natural Gas with CCS in this alternative is also likely to result in clustering of generating capacity proposals around preferred locations than that of updated EN-1, as the closer a power station is to a viable route to transport and store CO2, the lower the costs of retrofitting CCS to that power station could be. As such, there is the potential for more cumulative local negative effects on the built environment.

Alternative A3 – As updated EN-1 without Nuclear

In comparison to updated EN-1, more emphasis on Renewable energy will also have potentially more negative impacts on the built environment due to the additional land area affected by wind and solar Renewables. There will also be more need for energy technologies that need to be located near to coasts, estuaries or rivers due to their water resource needs, in particular in the case of Natural Gas with or without CCS, affecting flood risk to built environment.

Headline SD themes	Updated EN-1	Alternative A1	Alternative A2	Alternative A3
The Built Environment		Positive / Negative	Negative	Negative

The Natural Environment

Alternative A1 – As updated EN-1 without Nuclear and Unabated Natural Gas

Renewable technologies tend to involve more extensive land use than thermal power plants of equivalent capacity although Natural Gas with CCS technology also requires extra land for the installation of CCS. This means that with more emphasis on renewable energy in this alternative, in comparison to updated EN-1, there may be negative effects on the natural environment due to the additional land area affected.

In the case of offshore renewables power, they involve extensive sea use and there are clearly effects on the natural marine environment such as on biodiversity and visual impact, though these could be mitigated by careful siting.

This means that while more emphasis on renewable energy may have a positive effect on certain natural environment attributes, by contributing to the mitigation of climate change, there will also be potentially negative impacts on other environmental attributes such as visual impact and direct habitat loss due to the additional land / sea area affected.

Alternative A2 – As updated EN-1 without Unabated Natural Gas

As per updated EN-1, the inclusion of Nuclear in this alternative would result in a more efficient use of land as more energy can be generated per square meter in comparison to the use of land based renewables, thus potentially resulting in less direct habitat, heritage, soil, water features etc loss.

However, in comparison to updated EN-1, this alternative does not have unabated gas and as such there may be a requirement for more land take (to allow for CCS) and this may have a greater effect on the natural environment.

Alternative A3 – As updated EN-1 without Nuclear

The absence of Nuclear from this alternative, in comparison to updated EN-1, means that there would be less overall efficient use of land / sea, as less energy can be generated per square metre. This would likely result in more direct habitat, heritage, soil, water features etc loss.

Headline SD themes	Updated EN-1	Alternative A1	Alternative A2	Alternative A3
The Natural Environment		Negative	Negative	Negative

Summary Alternative Findings and Preferred Approach for the NPS

The findings of the assessment of alternatives are summarised on Table 5-17. This shows how Alternatives A1, A2, and A3 were assessed as affecting the headline SD topics compared to updated EN-1. The detailed assessment of updated EN-1, appraising its absolute effects of on the AoS objectives, is presented in section 5 of this report.

Table 5-17: Summary of Alternative Assessment for updated EN-1

Headline SD themes	Updated EN-1	Alternative A1	Alternative A2	Alternative A3
Climate Change (Net Zero)		Large Positive	Large Positive	Negative
Security of Energy Supply		Large Negative	Negative	Negative
Health & Well-Being		Neutral	Neutral	Neutral
The Economy		Neutral	Neutral	Neutral
The Built Environment		Positive / Negative	Negative	Negative
The Natural Environment		Negative	Negative	Negative

In comparison with updated EN-1, the alternatives are assessed as being beneficial in respect of climate change for Alternative 1 and 2, but negative for Alternative 3. All Alternatives are considered negative in terms of Security of Supply due to the reduction in generation options. In terms of Health and Wellbeing and Economy, no differences have been identified between any of the Alternatives and updated EN-1. In respect of the other sustainability development themes of the Built and Natural Environment there is a more mixed picture of having mainly

adverse effects though with some benefits under other Alternatives. The key differences between the different alternatives and updated EN-1 are highlighted below.

Alternative A1 - As updated EN-1 without Nuclear and Unabated Natural Gas would:

- be materially beneficial for the achievement of Net Zero due to no emissions from unabated gas, although reliant on smaller group of low carbon technologies (due to the removal of Nuclear) for delivery;
- be materially adverse on security of supply as reliant on technologies still under development such as Hydrogen and Energy Storage at scale to ensure peak supply and maintain the stability and security of the electricity system;
- have no differential effects on the economy or human health (compared to updated EN-1) because of providing for a range of low energy sources to meet future energy needs, as well as economic stimulus and improved employment opportunities, though note some negative effects may arise due to disruption to existing industries / communities; and
- have a mix of beneficial and negative effects on the built and natural environment due to positive environment effects through for example mitigation of climate change, though negative due to large areas of land and sea required for renewables.

Alternative A2 - As updated EN-1 without Unabated Natural Gas would:

- be materially beneficial for the achievement Net Zero due to no emissions from unabated gas;
- have adverse effects on Security of Supply, as although it would be less reliant (than alternative A1) on yet to be fully proven technologies, such as Hydrogen and Energy Storage at scale, there would still be a need for them to ensure peak supply and maintain the stability and security of the electricity system;
- be neutral (compared to EN-1) in relation to benefits to the Health and Well-being and Economy SD themes by providing for a range of low energy sources to meet future energy needs, as well as economic stimulus and improved employment opportunities though there may also be economic and community costs at the local scale; and
- have a negative effect for the Built and Natural Environment as greater use of Natural Gas with CCS (compared to EN-1) may require more land take due to the associated need for CCS infrastructure.

Alternative A3 - As updated EN-1 without Nuclear would:

- have adverse effects on the achievement of Net Zero due to greater ongoing emissions from unabated gas;

- have adverse effects on Security of Supply as reliant on a smaller range of electricity generating technologies;
- be neutral in terms of Health and Well-being and the Economy by providing for a range of low energy sources to meet future energy needs, as well as economic stimulus and improved employment opportunities though there may also be economic and community costs at the local scale;
- have adverse effects for the Built Environment due to additional land take by wind and solar Renewables and location near to coasts, estuaries or rivers by Natural Gas with or without CCS, affecting flood risk; and
- have adverse effects for the Natural Environment as emphasis on Renewables and Natural Gas with CCS would require larger areas (both on land and at sea) to meet the same energy output as updated EN-1.

None of these alternatives are as good as, or better than, the proposals set out in updated EN-1 and therefore the government's preferred option is to take forward updated EN-1 (and the updated technology-specific NPSs EN-3 and EN-5, see following sections). Note that the Clean Power 2030 Action Plan states that the impact of reaching Clean Power by 2030 will help to shield consumers from international energy price spikes by reducing reliance on fossil fuels, and accelerating deployment of renewables, nuclear, hydrogen, CCUS, and related network infrastructure and updated EN-1, EN-3 and EN-5are now set out to reflect these wider requirements by introducing greater flexibility in energy infrastructure provision at the national level.

5. Assessment for Renewable Energy Infrastructure (updated EN-3)

Introduction

The NPS for Renewable Energy Infrastructure (EN-3), in conjunction with the Overarching NPS for Energy (EN-1), sets out the relevant planning factors that should be considered by the Secretary of State when determining whether development consent should be granted for a proposed scheme.

As for updated EN-1, updated EN-3 has been developed via an iterative process, taking account of the appraisal of the predicted sustainability effects both for updated EN-3 preferred polices and reasonable alternatives.

Appraisal findings for updated EN-3

Renewable energy infrastructure may have various impacts on communities and the environment depending on the nature of the development and its location. As noted in updated EN-3, all of the generic impacts detailed in updated EN-1 are likely to be relevant to this type of infrastructure, however, there are further specific considerations arising from the technologies covered in updated EN-3 which are covered in this section.

The technologies concerned as detailed in updated EN-3 are:

- energy from biomass and/or waste including mixed waste containing non-renewable fractions (>50 MW in England and >350MW in Wales);
- pumped hydro storage (>50 MW in England and >350MW in Wales);
- solar photovoltaic (PV) (>100 MW in England and >350MW in Wales);
- offshore wind (>100MW in England and >350MW in Wales);
- tidal stream (>100MW in England and >350MW in Wales); and
- onshore wind (>100 MW in England only). Note that in Wales, all onshore wind generation, regardless of capacity will be decided by the relevant Welsh authority.

It is noted the addition of onshore wind to the list of renewable energy infrastructure covered by updated EN-3.

While reference should be made to updated AoS-1 for consideration of all generic sustainability effects in full, this updated AoS-3 focuses on those potentially significant sustainability effects associated with the technologies set out in the updated EN-3 (henceforth referred to as non-generic effects). The non-generic effects considered relate to the following AoS Objectives:

- Carbon emissions – AoS Objective 1;
- Biodiversity – AoS Objective 3;
- Landscape and Seascape – AoS Objective 6;
- Air quality – AoS Objective 8;
- Health and Wellbeing – AoS Objective 11;
- Economy – AoS Objective 13; and
- Resources – AoS Objective 14.

It should be noted that for all other AoS Objectives effects were considered to be adequately addressed within updated EN-1. As such this AoS does not consider such issues further.

The likely significant effects of the technology specific policies, requirements and guidance in updated EN-3 have been appraised against the corresponding objectives in the AoS framework as set out above.

Section 2 of this report explains how the results of the assessment of likely significant effects are shown. For ease of reference, the table is reproduced here.

Table 6-1: Key to appraising significance of predicted effects

Likely significance of effects		
Significant positive effect likely	**+++**	Policy is expected to address an existing sustainability problem (for example air pollution) or deliver sustainability enhancements, such as substantial environmental net gain above existing/emerging policy.
Minor positive effect likely	**+**	Policy is expected to lead to environmental net gain in line with existing or emerging Government policy OR result in protection and conservation of a sustainability asset (for example, a designated biodiversity site or designated heritage asset).
No effect likely or not applicable	**0**	No perceptible effects expected, or the objective is not relevant to the part of the NPS being assessed.
Minor negative effect likely	**-**	Policy is expected to result in adverse effects of a lower magnitude or smaller scale, which can be mitigated through standard measures and best practice.
Significant negative effect likely	**--**	Policy is expected to result in adverse effects of a greater magnitude or larger scale, which cannot be mitigated OR will require extensive and bespoke mitigation solutions (further studies may be required to identify appropriate solutions).

The appraisal focused on the identification of technology non-generic effects with consideration of mitigation measures as set out in updated AoS-1, in order to establish whether additional mitigation would be required as part of updated AoS-3.

The likely non-generic effects arising specifically from electricity generating infrastructure are presented together with a summary of the residual non-generic effects on updated EN-3 for each AoS objective over the short, medium and long term.

In this context, for the purposes of the appraisal, the “short term” has been defined as the effects arising generally during the infrastructure construction period typically 2-7 years (different technologies have different construction times); the “medium term” as typically between 5 and 30 years (operational lifetimes vary with the characteristics of different technologies); and the “long term” as beyond 30 years (and including decommissioning where relevant).

In addition, consideration is given to the secondary, cumulative and synergistic effects associated with the updated EN-3.

AoS Objective 1: Consistent with the national target of reducing carbon emissions to Net Zero by 2050

Anticipated effects

Electricity generation from renewable sources of energy is an important element in the development of a low-carbon economy, as set out in the Government’s Net Zero Strategy. The Government needs to transform the energy system, increasing the supply of clean energy from renewables, nuclear and hydrogen manufactured using low carbon processes, and where carbon is still emitted, developing the industry and infrastructure to capture, transport and store it. Electricity generation from renewable sources of energy promoted by updated EN-3 (ie. pumped hydro storage, solar photovoltaic, offshore and onshore wind and tidal stream) is an essential element of the transition to net zero as these sources produce zero or low carbon energy.

However, updated EN-3 continues to promote energy from biomass and/or residual waste (including mixed waste containing non- renewable fractions) which are acknowledged to produce carbon emissions, due to the presence of carbon in the biomass and of fossil-based carbon which exists alongside the biodegradable materials in the waste. Energy from waste is only partially renewable due to the presence of fossil fuel carbon in the waste.

Approach to development and mitigation in updated EN-1 and updated EN-3

Both updated EN-1 and updated EN-3 endorse the government commitment in the Net Zero Strategy, published in October 2021, to action so that by 2035, all electricity will come from low carbon sources, subject to security of supply, whilst meeting a 40-60% increase in demand. Furthermore, they endorse the latest government’s mission for Clean Power by 2030, announced in July 2024, which accelerates the Net Zero Strategy low carbon electrification plan to 2030 and sets out a series of bold commitments to deliver a more independent and more secure energy system. Securing affordable, homegrown renewables means power systems will be able to run for increasing periods on low carbon generation, with renewables

providing the vast majority of generation. The clean power capacity ranges for variable technologies established in Clean Power 2030 are 43 – 50 GW for offshore wind, 27 – 29 GW for onshore wind, and 45 – 47 GW for solar.

Policies set out in the updated EN-1 which are of particular relevance to carbon emissions from biomass and energy from waste electricity generating stations include the requirement for CCS and CCR for proposals for new and refurbishing combustion plants. As CCS is currently not commercially available for installation in new combustion generation plants, current government policy is for new biomass and Energy from Waste (EfW) generating stations with a generating capacity at or over 300MW to be carbon capture ready (CCR), in accordance with the government's 'Decarbonisation Readiness' requirements once they come into force.

Updated EN-1 sets out that applicants need to demonstrate that their proposals comply with relevant CCR guidance and will not receive consent from the Secretary of State unless their proposal is judged to be CCR.

Updated EN-1 clarifies that as the primary function of EfW plants, or similar processes, is to treat waste, applicants must demonstrate that proposed facilities are in line with the government's policy position on the role of energy from waste in treating residual waste to meet the strict criteria set out by government:

- That their projects meet a clearly defined need to facilitate the diversion of non-recyclable waste away from landfill, or enable the replacement of older, less efficient waste incinerators; and
- Can be built Carbon Capture ready, in accordance with the government's 'Decarbonisation Readiness' requirements once they come into force; and
- Demonstrate that making use of the heat they produce is viable and they can connect to a heat network within three years of the plant's operation.

Updated EN-3 acknowledges that the combustion of biomass for electricity generation plays an important role in meeting the UK's energy needs and supports the decarbonisation of the sector and that this technology only has a potentially significant role in supporting delivery towards the UK's net zero target when combined with CCS.

Updated EN-3 further clarifies that the primary function of EfW plants is to treat waste. Applicants must demonstrate that proposed EfW plants will help lower the amount of non-recyclable waste sent to landfill, or enable the replacement of older, less efficient facilities. In line with Defra's policy statement, development consent will not be granted for further EfW developments in England unless these criteria are met. In addition, the Welsh Government has put in place a moratorium on all new EfW plants greater than 10MW generation capacity in Wales, therefore, no further EfW developments in Wales will be consented under updated EN-3.

Updated EN-1 further notes that operational greenhouse gas emissions are a significant adverse impact from some types of energy infrastructure which cannot be totally avoided (even with full deployment of CCS technology). Given the characteristics of these and other

technologies, as noted in Part 3 of updated EN-1, and the range of non-planning policies that can be used to decarbonise electricity generation, such as the UK ETS (see Section 2 of updated EN-1), government has determined that operational greenhouse gas emissions are not reasons to prohibit the consenting of energy projects or to impose more restrictions on them in the planning policy framework than are set out in the energy NPSs (e.g. the CCR requirements). Any carbon assessment will include an assessment of operational GHG emissions, but the policies set out in Part 2, including the UK ETS, can be applied to these emissions. Operational emissions will be addressed in a managed, economy-wide manner, to ensure consistency with carbon budgets, net zero and our international climate commitments. The Secretary of State does not, therefore need to assess individual applications for planning consent against operational carbon emissions and their contribution to carbon budgets, net zero and international climate commitments.

Assessment made in respect of updated EN-3

Updated EN-3 technologies promote the supply of energy from low carbon/renewable energy sources in general, but biomass and waste combustion technologies are known sources of CO2 emissions. It follows that both technologies only have a potentially significant role in supporting delivery towards the UK's net zero target when combined with CCS. As CCS is currently not commercially available for installation in new combustion generation plants, CCR is the only requirement government is placing on combustion plants generally and that includes biomass combustion and EfW. Previously waste combustion technology was exempt from the requirement for CCR but this will come into force for new and substantially refurbished EfW facilities from 28 February 2026 in England.

Due to the new requirement for CCR on waste combustion technology alongside the strict criteria now set out by government for this type of technology, it is deemed that this technology, alongside biomass with CCR, will likely have a non-generic minor negative effect on carbon emissions in the short to medium terms. In the long term, as CCS is installed in such plants their effects will be neutral. It is also the case that provisions in Section 5 of updated EN-1 will go some way to address operational emissions from these generation plants.

Non-generic effects with regards to the achievement of Net Zero are therefore considered minor negative over the short and medium term. In the long term, biomass and EfW will be subject to CCR and as such this will be neutral.

Table 6-2: Consistent with the national target of reducing carbon emissions to Net Zero by 2050 Objective Summary

AoS Objective: Consistent with the national target of reducing carbon emissions to Net Zero by 2050	**Technology**	**Assessment of non-generic effects (by timescale)**		
Guide questions: • Reduction of the carbon emissions of the national portfolio of major energy infrastructure?		S	M	L
	Biomass and EfW	**-**	**-**	**0**

• Reduction of direct and indirect emissions of all greenhouse gases, including carbon dioxide, during construction, operation and decommissioning? • Supply of energy from low carbon/renewable energy sources / use of low carbon/renewable energy? • Use carbon removals to offset residual emissions from energy such Negative Emissions Technologies (NET) and Nature Based Solutions (NBS)? • Creation of new carbon sinks/removals through natural sequestration including that by natural habitats, blue-green infrastructure and soils? • Support an energy system consistent with reducing carbon emissions to Net Zero by 2050 and long term emphasis on electrification of Clean Power 2030?				

AoS Objective 3: Enhance biodiversity and ecological networks, deliver biodiversity net gain, protect and support ecosystem resilience and functionality

Anticipated effects

Updated EN-3 identifies a number of non-generic effects on biodiversity from renewable energy projects other than biomass/ EfW combustion plants. This is due to biomass/ energy from waste combustion plants biodiversity effects being covered by generic provisions for electricity generating infrastructure in updated EN-1.

Updated EN-3 identifies a number of non-generic effects on marine biodiversity from Offshore Wind farms. These include impacts on fish; seabed habitats and species including intertidal and subtidal; marine mammals; and birds. Updated EN-3 also recognises the need for strategic level assessments, as a result of the cumulative effects from multiple offshore wind farms. In addition, the construction, operation and decommissioning of offshore energy infrastructure can impact the physical offshore environment, which can affect biodiversity. The following elements can be affected: the water quality, as a result of the disturbance of sediments or the release of contaminants; waves and tides from the presence of turbines; the scour effect from the presence of wind turbines and other infrastructure; the sediment

transport; suspended solids as a result of the release of sediment; sand waves, as a result of any modifications or clearance; and the water column, as a result of a change in hydrodynamics and turbulence around wind turbine structures. Fish species can be affected from energy emissions into the environment such as noise or electromagnetic fields, as well as from the seabed sediments. Intertidal habitats and species can be affected by the installation of cable across the intertidal / coastal zone. Invasive and non-native species also pose a risk and this is recognised in updated EN-3. Marine mammals can be affected by noise from construction activities, which can be high enough to cause disturbance, injury, or even death; by collision with construction and maintenance vessels; by entanglement from floating wind structures, and indirectly by impacts on fish upon which the marine mammals prey. Birds can be affected by: collisions with rotating blades and other structures; direct habitat loss; disturbance from construction activities; displacement during the operational phase resulting in loss of foraging/ roosting area; impacts on bird flight lines i.e. barrier effect, and associated increased energy use by birds for commuting flights between roosting and foraging areas; and impacts on prey species and habitat. Subtidal habitats and species can be affected by loss and temporary disturbance of subtidal habitat and benthic ecology, during the construction, maintenance and decommissioning phases.

Similarly, Onshore Wind farms can have a range of non-generic effects on biodiversity. Of particular note birds and bats can be affected by: collisions with rotating blades; direct habitat loss; disturbance from construction activities; displacement during the operational phase resulting in loss of foraging/ roosting area; impacts on flight lines i.e. barrier effect, and associated increased energy use for commuting flights between roosting and foraging areas; and impacts on prey species and habitat.

Specific non-generic effects on biodiversity from pumped hydro storage plant include: habitat loss or alteration resulting from flooding of land or vegetation clearance; removal and damage of soil arising from alterations to landscape hydrology and/ or construction of infrastructure; and compromised water quality impacting aquatic flora and fauna.

Specific considerations identified by updated EN-3 which apply to Solar Farms include the impact on habitats, ground nesting birds, wintering birds, bats, dormice, reptiles, great crested newts, water voles and badgers.

Specific considerations which apply to Tidal Stream energy identified in updated EN-3 include fish; seabed habitats – intertidal and subtidal; and marine mammals. These could potentially be adversely affected by habitats loss and change from tidal barrages, underwater noise and emission of electromagnetic fields, and also by collision with / entrainment in underwater turbine structures.

Approach to development and mitigation in updated EN-1 and updated EN-3

Updated EN-3 (and updated EN-1) note that good design of a project should be applied to all energy infrastructure, to mitigate impacts such as the effects on ecology.

For Offshore Wind farms, the applicant should undertake an assessment of the impacts on offshore ecology, biodiversity and the physical environment for all stages of its lifespan, and to

consider biodiversity net gain. The applicant should undertake consultation with appropriate statutory consultees (and relevant other organisations as appropriate) at the early stages of the project. Reference must be made to best practice advice provided by the Offshore Wind Enabling Actions Programme (OWEAP) and / or the relevant SNCB, as well as to relevant scientific research and literature on the impacts of offshore wind farms, and to data from existing offshore wind farms where appropriate.

With reference to fish, the applicant should identify the fish species most likely to be affected with respect to: spawning grounds; nursery grounds; feeding grounds; over-wintering areas for crustaceans; migration routes; and protected sites; and the potential effects arising from underwater noise and electromagnetic fields.

With reference to intertidal/coastal habitats and species, the applicant should undertake an assessment of the effects of installing cable across the intertidal/coastal zone to demonstrate compliance with mitigation measures identified by the Crown Estate in any plan level HRA produced as part of its leasing round, and include information, where relevant, about: any alternative landfall sites that have been considered; any alternative cable installation methods that have been considered; potential loss of habitat; disturbance during cable installation, maintenance, and removal; increased suspended sediment loads in the intertidal zone during installation and maintenance; predicted rates at which the intertidal zone might recover from temporary effects; and protected sites.

With reference to marine mammals, the applicant should include within their assessment details of: likely feeding areas and impacts on prey species and habitats; known birthing areas/ haul out sites for breeding and pupping; migration routes; protected sites; baseline noise levels; predicted construction and soft start noise levels; operational noise; duration and spatial extent of the impacting activities; collision risk; entanglement risk and barrier risk. The applicant should consult with the relevant statutory bodies regarding the scope, effort and approach for surveys, and regarding any proposed noisy activities. Note also that Defra's policy paper on reducing noise from piling from January 2025 onwards should be considered and referenced alongside the position statement from JNCC, NE and Cefas on the use of noise reduction methods when piling, the position statement on minimising impacts from UXO clearance and any successor to these documents.

The applicant should consider noise abatement or mitigation to reduce noise levels and prevent noise thresholds from being exceeded. Where noise thresholds are likely to be exceeded the applicant should look at alternatives or mitigation. A Site Integrity Plan should be developed to allow the cumulative impacts of underwater noise to be reviewed, where the applicant should include the cumulative impact of noise from their own, and other developments and activities on the marine environment.

With reference to birds, the applicant should consult with the relevant statutory bodies regarding the scope, effort and approach for surveys, taking into consideration baseline and monitoring data from existing wind farms. The applicant must undertake collision risk modelling, and displacement and population viability assessments for certain species of birds.

With reference to subtidal habitats and species, the applicant should demonstrate compliance with mitigation measures identified by the Crown Estate in any plan level HRA produced as part of its leasing round. The assessment should include: loss of habitat due to foundation type; environmental appraisal of inter-array and export cable routes and installation/ maintenance methods including predicted loss of habitat; habitat disturbance; increased suspended sediment loads; predicted rates at which the subtidal zone might recover from temporary effects; potential impacts from EMF on benthic fauna; potential impacts upon natural ecosystem functioning, protected sites; and potential for invasive/non-native species introduction.

The Secretary of State should be satisfied that the applicant has used up to date research within their assessment and has assessed the impact on any protected species or habitats. With specific reference to the physical environment, the Secretary of State should be satisfied that the design of the windfarm and methods of construction reasonably minimise the potential for impact on the physical environment. In terms of mitigation, general requirements and considerations are provided in updated EN-1.

Additionally, the applicant should consider the best ecological outcomes in terms of mitigation, such as avoiding areas sensitive to physical effects, considering the micro-siting of array and cables, the alignment and density of the array, the design of the foundations, ensuring that sediment moved is retained as locally as possible, burying cables to a necessary depth, and using scour protection techniques around offshore structures. An Environmental Improvement Package including nature-based design standards and minimum requirements could be used to mitigate impacts.

With specific reference to fish, the Secretary of State should consider the negative impacts on benthic habitats from external cable protection used to mitigate effects from electromagnetic fields. The applicant should ensure the latest research on mitigation options for electromagnetic fields is presented. Construction activities should be timed to reduce impacts on spawning or migration on fish, and underwater noise mitigation used to prevent death or injury to fish species. With specific reference to intertidal and coastal habitats, the Secretary of State should be satisfied that cable installation and decommissioning has been designed sensitively, noting that the conservation status of the habitat is of relevance. Mitigation measures will not be able to prevent all adverse impacts.

Review of up-to-date research should be undertaken and all potential avoidance, reduction and mitigation options presented. Where applicable, use of horizontal directional drilling should be considered to avoid impacts on sensitive habitats and species. Where cumulative effects are predicted as a result of multiple cable routes, it may be appropriate for applicants of various schemes to work together to ensure that the number of cables crossing the intertidal zone are minimised.

With specific reference to marine mammals, the Secretary of State may refuse consent where significant noise effects cannot be minimised, and should be satisfied that the preferred methods of construction are designed reasonably to minimise significant impacts. Unless

suitable noise mitigation measures have been used, or can be secured through requirements within a development consent the Secretary of State may refuse the application.

Before and during piling, monitoring of the surrounding area should be undertaken, and acoustic deterrent devices used to actively displace marine mammals outside potential injury zones. Soft start procedures during pile driving may be implemented to enable marine mammals in the area to move away from the piling before injury is caused. Where noise impacts cannot be avoided or reduced to acceptable levels, other mitigation should be considered including spatial/ temporal restrictions on noisy activities, alternative foundation types, alternative installation methods and noise abatement technology. The applicant should undertake a review of up-to-date research and present all potential mitigation options as part of the application. Consultation should be made of the relevant JNCC guidelines, as well as Defra's policy position on reducing noise and the position statement from JNCC, NE and Cefas on the use of noise reduction methods when piling, as well as any successor to these documents. The government intends to develop minimum design standards as part of the Offshore Wind Environmental Improvement Package (OWEIP), which aim to reduce environmental impacts at the point of project design and as such may contain requirements to reduce noise levels.

With specific reference to birds, the Secretary of State must be satisfied that the collision risk and displacement assessments have been conducted to a satisfactory standard, and that advice from the relevant statutory bodies has been taken into account. The applicant should undertake a review of up-to-date research and present all potential mitigation options. Collision risk should be minimised by: considering how the wind turbines are laid out taking into account other constraints; and optimising turbine parameters. Construction and maintenance vessels should avoid rafting seabirds during sensitive periods, where practicable and compatible with operational requirements and navigational safety, and follow agreed navigation routes to and from the site, and minimise the number of vessel movements overall. Currently, shutting down turbines within migration routes during estimated peak migration periods is considered unlikely to offer suitable mitigation.

With specific reference to subtidal habitats and species, the applicant should design appropriate construction, maintenance, and decommissioning methods to minimise effects on subtidal habitats. The applicant should undertake a review of up-to-date research and present all potential avoidance, reduction and mitigation options. The Secretary of State should expect the applicants to consider the following mitigation measures: surveying and micrositing of the turbines, designing array layout, or re-routing of the export and inter-array cables to avoid adverse effects on sensitive/protected habitats, biogenic reefs or protected species; reducing as much as possible the amount of infrastructure that will cause habitat loss in sensitive / protected habitats, burying cables at a sufficient depth, taking into account other constraints, to allow the seabed to recover to its natural state; and minimising the use of anti-fouling paint on subtidal surfaces (in certain environments) to encourage species colonisation on the structures (unless within a soft sediment MPA and thus would allow colonisation by species that would not normally be present). The Secretary of State should be satisfied that activities have been designed considering sensitive subtidal environmental aspects, and that discussions with relevant conservation bodies have taken place. Ecological monitoring should be undertaken

during the pre-construction, construction, and operational phases to identify the actual impacts and compare them to those predicted. Where impacts are greater than those forecast, an adaptive management process may need to be implemented and additional mitigation required.

For Pumped Hydro storage projects, the applicant should particularly take into account the ecological status of the water environment. No further specific mitigation measures to those identified in updated EN-1 are included in updated EN-3. However, some pumped hydro storage projects can provide benefits to local biodiversity through habitat creation and/or enhancement, fish re-stocking and bankside planting.

For Solar Farms, the applicant should identify any particular ecological risk from developing on the proposed site, and should use an advising ecologist during the design process to ensure that adverse impacts are avoided, minimised or mitigated in line with the mitigation hierarchy, and biodiversity enhancements are maximised. The applicant's assessment should consider earthworks associated with construction compounds, access roads and cable trenching, to minimise soil damage; how security and lighting installations may impact on the local ecology; how site boundaries are managed, and whether any hedges/ scrub are to be removed; the enhancement, management and monitoring of biodiversity in line with the 25 Year Environment Plan; the Environmental Improvement Plan 2023; any relevant measures or targets, including those in the Environment Act; and whether geotechnical and hydrological information should be provided, including identifying the presence of peat and the risk of landslide. A Flood Risk Assessment may also be required to consider the impact of drainage. The Secretary of State should consider the maximum adverse effects from water management in the consideration of the application. The Secretary of State should also specifically take into consideration where the location of the solar farm is on peat, to ensure minimal disruption to the ecology, or release of carbon. Specific mitigation measures could include maintaining or extending existing habitats and potentially creating new important habitats. An ecological monitoring programme is recommended to monitor impacts upon the flora and any particular ecological receptors at the site, the results of which would inform any changes needed to the land management of the site, including any livestock grazing regime. Proposed enhancements should aim to achieve environmental and biodiversity net gain in line with the 25 Year Environment Plan, the Environmental Improvement Plan 2023, and any measures or targets in the Environment Act.

For Tidal Stream energy, applicants must undertake a detailed assessment of the offshore ecological and biodiversity impacts for all phases in accordance with policy in EN-1. This would include consideration of generic impacts common to other technology types, such as offshore wind, which may be incurred during construction or operation of tidal stream energy. Applicants should also demonstrate that their site selection, project design and mitigation plans have been determined with regard to the evidence base of ecological and biodiversity impacts developed for intermediate-scale developments. Applicants should also assess the potential of their proposed development to have net positive effects on marine ecology and biodiversity. The Secretary of State should be satisfied that the applicant has made appropriately extensive use of the evidence base developed through monitoring at intermediate-scale tidal stream projects. Where adverse effects on site integrity or conservation objectives are predicted within a protected site, the Secretary of State should consider the extent to which the effects are

temporary or reversible and the timescales for recover. Where the Secretary of State determines that evidence within the application could be usefully supplemented, monitoring requirements for specific receptors may be imposed on the applicant, and the Secretary of State must be satisfied that the results of the monitoring will be made publicly available for other projects to draw upon. The primary form of mitigation is expected to be the careful design and siting of the development, along with the choice of construction and installation techniques.

For Onshore Wind Farms, use should be made of an advising ecologist during the design process to ensure adverse impacts are avoided, mitigated or compensated and biodiversity enhancement maximised. In addition, an ecological assessment should identify any ecological risk from developing on the proposed site. Updated EN-3 notes that onshore wind farms have the potential to increase the biodiversity value of a site, especially if the land was previously intensively managed. In some instances, this can result in significant benefits and enhancements beyond Biodiversity Net Gain, which result in wider environmental gains which is encouraged. As such, applicants should consider enhancement, management, and monitoring of biodiversity in line with the ambition set out in the Environmental Improvement Plan and any relevant measures and targets, including statutory targets set under the Environment Act or elsewhere.

In specific reference to birds and bats, updated EN-3 notes that applicants must conduct a thorough assessment of impacts on birds and bats. The level of assessment effort should be determined in accordance with best practice and take into account the proximity of ecological receptors.

Applicants should discuss the scope, effort and methods required for assessments with the relevant statutory advisor, taking into consideration baseline and monitoring data from operational windfarms. It is to be noted that it may be appropriate for the assessment to include collision risk modelling for certain species of birds or to estimate the mortality rate for certain species of bat. Applicants are expected to seek advice from SNCBs.

New advice on assessing the risks to bats is available from NatureScot. This advice applies to England, and replaces previous guidance published by Natural England (TIN051), Chapter 10 of the Bat Conservation Trust publication Bat Surveys: Good Practice Guidelines, and tailors the generic Eurobats guidance. NatureScot and Natural England also provide advice relating to birds, including survey requirements.

Assessment made of in respect of updated EN-3

Non-generic effects on biodiversity are likely to occur with all renewable energy generation projects covered in updated EN-3 with regards to biodiversity, some of which could be significant. This includes impacts on fish; seabed habitats and species including intertidal and subtidal; marine mammals; and birds in marine environments and in terrestrial environments habitat loss or alteration resulting from land clearance and soil compaction; and/ or construction of infrastructure; and compromised water quality impacting aquatic flora and fauna.

Specific considerations identified by updated EN-3 which apply to Solar Farms include the impact on habitats, ground nesting birds, wintering birds, bats, dormice, reptiles, great crested newts, water voles and badgers.

Specific considerations which apply to Tidal Stream energy identified in updated EN-3 include fish; seabed habitats – intertidal and subtidal; and marine mammals. These could potentially be adversely affected by underwater noise and emission of electromagnetic fields, and also by collision with underwater turbine structures.

Specific considerations which apply to Onshore Wind identified in updated EN-3 include the potential impacts on birds and bats, such as in areas spanning migration or commuting routes or important feeding, breeding and roosting areas of bird and bat species known to be at risk - there is a risk of harm, either through disturbance, habitat loss or collision.

Effects on biodiversity may occur at all stages of the project, and may be direct or indirect, temporary or permanent. The significance of these effects will be determined during EIA and appropriate mitigation measures in accordance identified to minimise any adverse effects, or maximise opportunities for enhancement.

Positive specific effects associated with the technologies may occur on fishing industry with increased catches as a result of offshore wind farms acting as fish nurseries; on biodiversity from solar farms, where land is no longer managed intensively; on biodiversity from pumped hydro storage schemes, as a result of habitat creation and fish re-stocking; and on resources where residues from biomass can be recovered and re-used rather than being sent to landfill. Onshore wind farms offer opportunities for increasing the biodiversity value of a site, particularly if the land was previously intensively managed. In some instances, this can result in significant benefits and enhancements beyond Biodiversity Net Gain, which result in wider environmental gains which is encouraged.

Updated EN-3 emphasises the importance of ensuring that the applicant has used up to date research within their assessments, and that consultation has been carried out with relevant bodies to ensure where monitoring needs to take place the scope and approach is agreed, and appropriate mitigation measures are agreed. There could also be cumulative impacts which will need to be taken into account, where mitigation measures alone may not be able to address these issues, meaning that compensation may be required.

The non-generic effects on biodiversity are considered to be minor negative over all timeframes for all renewable infrastructure projects. All effects will clearly vary according to the type of impact, the specific location of the site, and the habitats and species affected, and there may be opportunities for enhancement and biodiversity net gain.

Table 6-3: Enhance biodiversity and ecological networks, deliver biodiversity net gain, protect and support ecosystem resilience and functionality

AoS Objective: Enhance biodiversity and ecological networks, deliver biodiversity net	Technology	Assessment of non-generic effects (by timescale)

gain, protect and support ecosystem resilience and functionality				
Guide questions: • Protect and enhance nationally designated sites such as SSSIs and National Nature Reserves, Marine Conservation Zones, Marine Protection Areas and Highly Protected Marine Areas, including those of potential or candidate designation? • Protect and enhance valued habitat and populations of protected/scarce species on locally designated sites, including Key Wildlife Sites, Local Wildlife Sites and Local Nature Reserves? • Protect the structure and function/ecosystem processes, including in the marine environment? • Protect and enhance the Nature Recovery Network? • Protect and enhance priority habitats, and the habitat of priority species? • Promote new habitat creation or restoration and linkages with existing habitats? • Protect and enhance the wider green infrastructure network? • Increase the resilience of biodiversity to the potential effects of climate change? • Reduce or avoid impacts to habitats with important roles in carbon sequestration? • Encourage sensitive or nature inclusive design in terrestrial and marine environments? • Ensure energy activities protect fish stocks and marine mammals?		S	M	L
	Offshore Wind	**-**	**-**	**-**
	Pumped hydro storage	**-**	**-/+**	**-/+**
	Solar Photovoltaic Generation	**-**	**-/+**	**-/+**
	Tidal Stream Energy	**-**	**-**	**-**
	Onshore wind	**-/+**	**-/+**	**-/+**

• Ensure energy activities do not exacerbate disturbance to bird populations? • Deliver a minimum 10% net gain in biodiversity for any new major infrastructure development? • Increase the resilience of biodiversity to the potential effects of climate change? • Prevent spread of invasive species (native and non-native), including new invasive species because of climate change?				

AoS Objective 6: Protect and enhance the character and quality of the landscapes, townscapes and waterscapes and protect and enhance visual amenity

Anticipated effects

Updated EN-3 identifies that that there may be specific concern of the impact on landscape from Biomass/ EfW generating stations, given the overall size of the buildings.

There will also be specific considerations on seascape and visual impact associated with Offshore Wind farms. Seascape is an important environmental, cultural and economic asset, especially where the seascape provides the setting for a nationally designated landscape and supports the delivery of the designated area's statutory purpose (conservation and enhancement of natural beauty), and for Heritage Coasts.

Pumped Hydro storage projects have the potential to specifically impact the landscape resulting from: construction of a concrete dam; construction of the generating station; substantial civil works for the scheme foundations and digging the reservoir; and flooding of land or disused quarries or pits to create the reservoir.

Regarding effects from Solar farms, these are likely to be in low lying areas of good exposure and as such may have a wider zone of visual influence than other types of onshore energy infrastructure. In addition, they may cover a significant surface area.

Onshore Wind farms have the potential to become a feature in the landscape to a greater or lesser degree, with both temporary and permanent effects possible. Their location will typically be upland sites, or if in low lying areas, those sites more exposed to prevailing winds. Such sites (upland or exposed lowland) typically have large zones of visual influence. Nationally designated landscapes (National Parks, the Broads and National Landscapes) collectively

referred to as Protected Landscapes, are particularly sensitive to large scale onshore wind development, though there would also be likely effects on areas noted at a more local level.

Updated EN-3 also identifies that there may be impacts on seascape and visual impacts from Tidal Stream energy projects.

Approach to development and mitigation in updated EN-3

Regarding Biomass/ EfW, the Secretary of State should be satisfied that the design of the proposed generating station is of appropriate quality and minimises adverse effects on the landscape character and quality. Good design that is sympathetic and contributes positively to the landscape character and quality of the area will go some way to mitigate adverse landscape and visual effects. Development proposals should consider the design of the generating station including the materials to be used in the context of the local landscape character. Mitigation is achieved primarily through aesthetic aspects of site layout and building design, although micro-siting within the development can help. Applicants should seek to visually enclose the generating station buildings at low level as seen from surrounding external viewpoints to help reduce the scale of impacts. Consideration could be given to using earth bunds and mounds, and / or tree planting to soften visual intrusion.

For Offshore Wind farms, a seascape and visual impact assessment (SLVIA) will be required where a coastal National Park, the Broads or National Landscape, or a Heritage Coast may be affected, and may be required in other circumstances in accordance with relevant offshore windfarm EIA policy. The SLVIA should be proportionate to the scale of the potential impacts. Where the offshore wind farm will not be visible from the shore, then a SLVIA is not likely to be required. Where necessary, assessment of the seascape should include an assessment of four principal considerations on the likely effect of the offshore wind farm on the coast: the limit of visual perception from the coast; the effects of navigation and hazard prevention lighting on dark night skies; individual landscape and visual characteristics of the coast and the special qualities of designated landscapes; and how people perceive and interact with the coast and seascape. Photomontages will be required, and the viewpoints should be selected in consultation with statutory consultees. The Secretary of State should not refuse to grant consent for a development solely on the ground of an adverse effect on the seascape or visual amenity unless: it considers that an alternative layout within the identified site could be reasonably proposed which would minimise any harm taking into account any other constraints; or the harmful effects are considered to outweigh the benefits of the proposed scheme. Where adverse effects are anticipated, the Secretary of State should take into account the extent to which the effects are temporary or reversible. In terms of mitigation it should be considered unlikely that mitigation in the form of reduction in scale will be feasible, however, the siting layout of the turbines should be designed appropriately to minimise harm, taking into account other constraints.

Regarding Pumped Hydro storage projects, the Secretary of State should be satisfied that the design of the proposed scheme is of appropriate quality and minimises adverse effects on the landscape character and quality. Good design that is sympathetic and contributes positively to the landscape character and quality of the area will go some way to mitigate adverse

landscape and visual effects. Development proposals should consider the design of the generating station and dam if required, including the materials to be used in the context of the local landscape. If spoil heaps arising during construction are kept within the locality, they should be located in a way that minimises their visual impact. Mitigation is achieved primarily through the aesthetic aspects of site layout and building design to minimise intrusive appearance in the landscape as far as engineering requirements permit. For example, it may be possible to house some of the station underground or inside the dam. Applicants should seek to visually enclose the dam and generating station at low level as seen from surrounding external viewpoints to help reduce the scale of impacts. Consideration could be given to using earth bunds and mounds, and / or tree planting to soften the landscape and visual intrusion. Note that the design of schemes located in or within the setting of designated landscapes should be sensitive to the natural beauty, special qualities and key characteristics of these landscapes.

For Solar farms, the applicant may be required to show visualisations to demonstrate the effects of a proposed solar farm on the setting of heritage assets and any nearby residential areas or viewpoints. Applicants should follow the criteria for good design set out in updated EN-1 and will be expected to direct considerable effort towards minimising the landscape and visual impact of the solar PV arrays. Security measures such as fencing should take into account the need to minimise the landscape and visual impact. The applicant should have regard in both the design layout and future maintenance plans for the retention of growth of vegetation on boundaries. Existing trees, woodlands, hedges and established vegetation should be retained wherever possible, and if necessary tree surveys or arboricultural/hedge assessments should be undertaken to inform the impact of the proposed development. In terms of mitigation, applicants should consider the potential to mitigate landscape and visual impacts through screening with native hedges, trees and woodlands, to minimise the use and height of security fencing, to use existing features to screen security fencing or to assist in site security. The use of security lighting should be minimised, and any lighting should use a passive infra-red technology and its impact minimised through design and installation practices.

Potential effects on seascape may also occur with Tidal array projects, although there is not yet sufficient evidence for these types of projects. Effects may be similar to those associated with offshore wind farms, and generic guidance in updated EN-1 should be followed.

In relation to Onshore Wind farms, generic impacts are addressed in updated EN-1. Note is made in EN-3 that to inform the landscape and visual impact assessments, consideration should be made of mapping zones of visual influence, mapping transport and access routes to identify viewpoints, undertake visualisations of the proposed development (including photomontages). Landscape Character Assessments and Landscape Sensitivity Studies should also be considered, as well as Protected Management Plans. Note that further information is provided by Natural England.

The LVIA should be reported in the ES and consideration should be made of likely effects on the setting of heritage assets and nearby residential areas or viewpoints. An assessment of the potential impacts on the statutory purposes of protected landscapes should form a part of the

pre-application process. Considerable effort toward minimising the landscape and visual effect of onshore wind farms (especially within nationally designated landscapes and their settings) should be made.

Consideration needs to be also made of 'shadow flicker' and those areas / properties which would be impacted – particularly those within certain directions and distances, which are most likely to have significant impacts. It is noted that modern wind turbines can be controlled so as to avoid shadow flicker when it has the potential to occur. Individual turbines can be controlled to avoid shadow flicker at a specific property or group of properties on sunny days, for specific times of the day and on specific days of the year. Where the possibility of shadow flicker exists, mitigation can be secured through the use of conditions. It is also noted in updated EN-3 that turbines can also cause flashes of reflected light, which can be visible for some distance. While it is possible to ameliorate the flashing, it is noted that it is not possible to eliminate it.

Applicants should mitigate the main landscape and visual impacts to a localised level through design layout or through, for example, screening with natural topography, trees and woodlands. Nevertheless it is acknowledged in EN-3 that mitigating adverse effects on the statutory purposes of protected landscapes will be very challenging and mitigation in the form of reduction of scale may not be feasible (due to issues such as significantly affecting power output).

Assessment made in respect of updated EN-3

Specific effects on landscape or seascape and on visual impact are expected to occur with all types of renewable infrastructure projects. Updated EN-3 notes that assessment of effects should be undertaken in accordance with updated EN-1, with the impact on seascape addressed where relevant. As set out in update EN-1, proposals should demonstrate good design in respect of landscape and visual amenity.

Adverse effects may occur at all stages of the project. The significance of these effects will be determined during EIA and appropriate mitigation measures identified to minimise any adverse effects. The effects on landscape and visual impact are therefore considered to be minor negative over all timeframes for all technologies other than Onshore Wind, although there is uncertainty associated with these effects. It is to be recognised that not all impacts can be mitigated and given the scale and likely number of receptors, significant landscape effects are anticipated for onshore wind.

Table 6-4: Protect and enhance the character and quality of the landscapes, townscapes and waterscapes and protect and enhance visual amenity Objective Summary

AoS Objective: Protect and enhance the character and quality of the landscapes, townscapes and waterscapes and protect and enhance visual amenity	**Technology**	**Assessment of non-generic effects (by timescale)**		
Guide questions:		S	M	L

• Avoid the development in National Parks and National Landscapes (formerly AONBs)? • Support the integrity of any areas designated for landscape value, including in conjunction with the provisions of any relevant Management Plan (e.g. National Parks, National Landscapes, Heritage Coasts and local landscape designations)? • Conserve and enhance the intrinsic character or setting of local landscapes or townscapes or waterscapes? • Minimise noise and light pollution from construction and operational activities on residential amenity and on sensitive locations, receptors and views? • Prevent reduced tranquility / preserve tranquility? • Conserve, protect and enhance natural environmental assets (e.g. parks and green spaces, common land, woodland / forests etc) where they contribute to landscape and townscape quality?	Biomass and EfW	-	-	-
	Offshore Wind	-	-	-
	Pumped Hydro Storage	-	-	-
	Solar Photovoltaic Generation	-	-	-
	Tidal Stream Energy	-	-	-
	Onshore Wind	--	--	--

AoS Objective 8: Protect and enhance air quality on a local, regional, national and international scale

Anticipated effects

As detailed in updated AoS-1, energy infrastructure projects have the potential for a number of generic adverse effects on air quality during construction, operation and decommissioning which include:

- emissions generated as a result of construction activities (transport emissions from the transport of materials, resources and personnel; dust and fumes from machinery operation, excavation and drilling);

- emissions from project operation (operation of plant, transport of materials, resources and personnel); and
- emissions from plant, machinery and vehicles during the decommissioning of projects (including transport to and from site).

Specific effects on air quality are only expected to occur with Biomass and EfW infrastructure projects.

Pollutants of concern arising from the combustion of waste and biomass may include NOx, SOx, NMVOCs and particulates. In addition, emissions of heavy metals, dioxins and furans are a consideration for waste combustion generating stations but limited by the Environmental Permitting Regulations and waste incineration BAT conclusions and regulated by the EA. Changes in air quality could affect both sensitive human health and ecological receptors, however, updated EN-3 notes that where the proposed plant meets the requirements of the IED and BAT conclusions and will not exceed the local air quality standards the Secretary of State should not regard the proposed plant as having adverse impacts on health.

A particular effect of NOx emissions from some energy infrastructure may be eutrophication of water bodies, which is the result of excessive enrichment of nutrients. The main emissions from energy infrastructure are from generating stations such as biomass and EfW. Eutrophication can affect plant growth and functioning, altering the competitive balance of species and thereby damaging biodiversity. In aquatic ecosystems it can cause changes to algal composition and lead to algal blooms, which remove oxygen from the water, adversely affecting plants and fish. The effects on ecosystems can be short term or irreversible and can have a large impact on ecosystem services such as pollination, aesthetic services and water supply.

It is worth noting that while there may be impacts at a local level on air quality from the construction of renewable energy generation, for the most part, these will result in improvements to air quality when operational.

Approach to development and mitigation in updated EN-1 and updated EN-3

The approach is the same as noted in updated EN-1, with the added requirement to ensure that the proposed plant meets the requirements of the IED and BAT conclusions. The significance of effects will depend upon local site-specific factors, such as transport routes and proximity to sensitive receptors and these will be dealt with during the project level EIA. For combustion plant using CCS, the ES should reflect the latest evidence on the air quality impacts of carbon capture using amine-based solvents.

Updated EN-3 notes that abatement technologies should be those set out in the relevant sector guidance notes as produced by the EA. The Secretary of State does not need to consider equipment section in its determination process.

Note is also made that applicants should include in the ES an assessment of the air emissions associated with delivery and movement of people, fuel and materials. This should include consideration of cumulative effects from construction, operation and vehicle movements. Note

is also made in updated EN-3 that applicants should take into account the presence of Air Quality Management Areas, NO2 Programme Clean Air Plans and proximity to large numbers of people and vulnerable receptors (e.g. health facilities, care homes and schools) when considering site selection.

Assessment made in respect of updated EN-3

Non-generic effects on local air quality are only expected to occur with biomass and EfW infrastructure projects as they involve combustion and the release of air pollutants.

Updated EN-1 notes that adverse effects may occur at all stages of the project, as a result of emissions released during construction, operation, and decommissioning. The significance of these effects will be determined during EIA and appropriate mitigation measures in accordance identified to minimise any adverse effects. The effects on air quality from biomass and EfW projects are therefore considered to be minor negative over all timeframes.

Updated EN-3 notes which pollutants should be considered within an assessment, but is clear that where a proposed project meets the requirements of the IED and BAT conclusions and does not exceed local air quality objectives then there should not be any adverse effects on human health. There may, however, be effects on sensitive ecological receptors which are not specifically mentioned in updated EN-3, although these effects are already included in updated EN-1.

Note that updated EN-3 now makes clear that the Welsh Government has put in place a moratorium on all new EfW plants greater than 10MW generation capacity in Wales, therefore, no further EfW developments in Wales will be consented under updated EN-3. EfW development with CCR will, however, still be consented in England with associated air pollution effects.

Table 6-5: Protect and enhance air quality on a local, regional, national and international scale Objective Summary

AoS Objective: Protect and enhance air quality on a local, regional, national and international scale	**Technology**	**Assessment of non-generic effects (by timescale)**		
Guide questions: • Minimise emissions of dust and other air pollutants that affect human health or biodiversity? • Improve air quality within AQMAs and avoid the need for new AQMAs? • Promote enhancements to green infrastructure networks to help improve air quality?	Biomass and EfW	S	M	L
		-	**-**	**-**

AoS Objective 11: Improve health and well-being and safety for all citizens and reduce inequalities in health

Anticipated effects

Biomass and EfW combustion may give rise to air pollution, as noted in the section above, noise and vibration, on odour, insect and vermin infestation. Sources of noise and vibration may include: delivery and movement of fuel and materials; processing waste for fuel at generating stations; the gas and steam turbines that will operate continuously; and external noise sources such as externally-sited air-cooled condensers that also operate continuously during normal operation. Insect and vermin infestation may be a particular issue with regard to storage of fuels for energy from waste generating stations as they may be attracted to biodegradable waste stored and processed at the facility. Odour is also likely to arise during the storage, handling and processing of biodegradable waste.

Specific effects are also identified from Pumped Hydro storage on noise and vibration as a result of the noise from the turbines and other power generation equipment during operation, and during construction, in particular if blasting is required to create new reservoirs.

Solar Photovoltaic generation is identified as potentially causing glint and glare which could affect residents, motorists, public rights of way, and aviation infrastructure, when the solar panels are located at certain angles between the sun and the receptor, and noise and vibration associated with traffic during the construction phase. This is considered specifically for solar farms, given their likely location in rural areas where a large number of vehicles may be necessary to transport necessary infrastructure along minor roads.

Onshore Wind farms have the potential to generate noise and vibration, as well as cause ‘shadow flicker’, which could impact on the wellbeing of sensitive receptors.

Approach to development and mitigation in updated EN-1 and updated EN-3

For biomass and EfW projects, the applicant should include a noise assessment of the impacts on amenity in case of excessive noise in accordance with updated EN-1. In addition to mitigation measures set out in updated EN-1, noise from gas and steam turbines should be mitigated by attenuation of exhausts and steam release valves to reduce any risk of low-frequency noise transmission, and the unavoidable noise from the sorting and transport of material during operation of the biomass or EfW generating stations and the apparatus external to the main generating stations should be mitigated through careful plant selection. Updated EN-3 also notes that a stack of sufficient height to safeguard human health is required. The Secretary of State should be satisfied that noise and vibration will be adequately mitigated through requirements attached to the consent, and the extent to which operational noise will be separately controlled by the EA or NRW. The Secretary of State should not grant consent unless satisfied that the proposals will meet the aims set out in updated EN-1. The applicant should also assess the potential for insect and vermin infestation and emissions of odour as set out in updated EN-1. In addition to the mitigation measures set out in updated EN-1, reception, storage and handling of waste and residues should be carried out within

defined areas, within enclosed buildings at EfW generating stations. The Secretary of State should be satisfied that the proposal sets out appropriate measures to minimise impacts on local amenity.

For Pumped Hydro storage projects, a noise assessment of the impacts on amenity in the case of excessive noise should be undertaken in accordance with updated EN-1. In addition to the mitigation measures identified in updated EN-1, it is noted that noise from the operation of the pumped hydro storage generating stations and from the apparatus external to the main generating station may be unavoidable. Mitigation will be through careful plant selection. Noise during construction, particularly from blasting, will also be unavoidable. Careful consideration should be given to mitigating the impact of this on noise sensitive receptors.

For Solar farms, it may be necessary in some instances for the applicant to undertake a glint and glare assessment as part of the application, to assess the potential for the combined reflective quality from solar panels, frames and supports. This may need to take into account tracking panels which can cause differential diurnal and/or seasonal impacts. Solar PV panels are designed to absorb, not reflect, irradiation. However, the Secretary of State should assess the potential impact of glint and glare on nearby homes, motorists, public rights of way and aviation infrastructure (and flight paths). Consideration should be given to the use of solar panels with an anti-glare/ anti-reflective coating with a specified angle of maximum reflection attenuation, to screening between affected receptors and reflecting panels, and adjusting the alignments or angles of the solar panels. The applicant should also consider any impact from noise resulting from construction traffic associated with solar farm proposals. Cumulative effects on the local road network should also be considered and disruption to local residents minimised through a transport delivery plan. Mitigation measures other than those specified in EN-1 may include temporary road widening.

In relation to Onshore Wind, noise and vibration are dealt with mainly via updated EN-1, though updated EN-3 notes that additional assessment of noise should be made to address particular issues related to wind turbines. Updated EN-3 notes that the method of assessing the impact of noise from a wind farm on nearby residents is described in the report, 'The Assessment and Rating of Noise from Wind Farms' (ETSU-R-97). This was produced by the Working Group on Noise from Wind Turbines Final Report, September 1996 and the report recommends noise limits that seek to protect the amenity of wind farm neighbours. Therefore, noise limits will often influence the separation of wind turbines from residential properties. Note should also be made of other guidance, which could be updated from time to time. Applicants are required to have good design as an inherent part of a wind farm and should consider the distance and placement of turbines in relation to residential buildings or other sensitive receptors to mitigate noise impacts.

Similarly, assessment should be undertaken of the issue of 'shadow flicker' and it is noted that it should be possible to calculate with a high degree of accuracy, the maximum number of hours each year that shadow flicker could occur at individual properties, including specific days of the year, times of the day and duration of each potential episode. It is noted that modern wind turbines can be controlled so as to avoid shadow flicker when it has the potential to occur. Individual turbines can be controlled to avoid shadow flicker at a specific property or group of

properties on sunny days, for specific times of the day and on specific days of the year. Where the possibility of shadow flicker exists, mitigation can be secured through the use of conditions. It is also important to note (as set out in updated EN-3) that shadow flicker frequencies are not in the region known to induce seizures in sufferers of epilepsy (which is above 3 hertz), and as such, where the frequency of potential flashes will not exceed 3 hertz, the Secretary of State should give no weight to any claims of effects on epileptics from onshore wind turbines.

Onshore Wind farms do also present other indirect opportunities for health benefits. For example, as updated EN-3 notes, applicants should consider and maximise opportunities to facilitate enhancements to the public rights of way and the inclusion, through site layout and design of access, of new opportunities for the public to access and cross the proposed onshore wind development sites (whether via the adoption of new public rights of way or the creation of permissive paths), taking into account, where appropriate, the views of landowners. This could lead to opportunities for improvements to wellbeing or more active lifestyles.

Assessment made in respect of updated EN-3

The specific negative effects on health from renewable technologies identified in updated EN-3 arise from air pollution, noise pollution, odour, insect and vermin infestation and from glint and glare from solar panels and vibration from wind turbines. These effects could occur over all timeframes, with some effects such as those on noise being unavoidable. For all of the specific effects identified, mitigation measures should be considered where possible. The assessment has shown that minor negative impacts are expected from biomass and EfW plants, and solar farms over all timescales, while those for pumped hydro storage are likely to be significant negative, as some of the effects may be unavoidable.

Table 6-6: Improve health and well-being and safety for all citizens and reduce inequalities in health Objective Summary

AoS Objective: Improve health and well-being and safety for all citizens and reduce inequalities in health	**Technology**	**Assessment of non-generic effects (by timescale)**		
Guide questions: • Protect the health of communities through prevention of accidental pollutant discharges, exposure to electric and magnetic fields, shadow flicker or radiation? • Minimise nuisance on communities and their facilities including, noise, artificial light, odour, dust, steam, smoke and infestations of insects? • Result in loss of recreational and amenity land or loss of access?		S	M	L
	Biomass and EfW	-	-	-
	Pumped hydro storage	--	--	-
	Solar photovoltaic generation	-	-	-
	Onshore wind	-	-	-

• Provide for facilities that can promote more social interaction and a more active lifestyle and enjoyment of the countryside and coasts? • Promote initiatives that enhance safety and personal security for all?				

AoS Objective 13: To promote a strong economy with opportunities for local communities

Anticipated effects

Offshore Wind farms may have non-generic effects on commercial fisheries and fishing, and on navigation and shipping due to their location at sea. While the footprint of an offshore windfarm and associated infrastructure may hinder certain types of commercial fishing activity such as trawling, other fishing activities, such as potting, may be able to take place without being unduly disrupted. Offshore Wind farms could potentially affect fish that is of both commercial interest and ecological value.

Offshore Wind farms will also impact on navigation and shipping in and around the area of the site, affecting both commercial and recreational users of the sea who may be affected by disruption or economic loss. Consent should not be given to projects which pose intolerable risks to navigational safety after all mitigation measures have been adopted.

Power generated from offshore windfarms can be transmitted to onshore networks through multi-purpose interconnectors to multiple neighbouring North Sea countries, reducing costs for consumers and maximising market access for generators.

On the other hand, the siting of offshore infrastructure associated with offshore wind farms will often occur in or close to areas where other offshore infrastructure such as telecommunication cables, oil or gas pipelines, and emerging technologies, such as CCUS or co-location of electrolysers for hydrogen production is located, thus affecting economic activity.

Pumped Hydro storage stores electricity ready for release when supply exceeds demand, and acts to maintain the resilience and stability of the grid. The need for electricity storage will rise as the amount generated by the more variable sources of wind and solar power increases, and demand is increased through the electrification of heat and transport. Specific effects from pumped hydro storage can occur on recreational activities such as watersports and fishing.

For Solar photovoltaic generation, there may be socio-economic benefits in retaining site infrastructure after the operational life, although no other specific economic effects are noted.

Potential effects on commercial fisheries and fishing, and navigation and shipping may also occur with Tidal array projects, although there is not yet sufficient evidence for these types of projects. Effects may be similar to those associated with offshore wind farms.

Onshore Wind farms could have potential implications for agriculture or for other landuse activities.

Approach to development and mitigation in updated EN-1 and updated EN-3

The diversity of the UK fishing industry is recognised in updated EN-3. The type and significance of impacts will therefore vary depending on the section of the fleet affected. Applicants should consider both direct impacts on fishing activity and indirect impacts such as displacement (on both the industry and Marine Protected Areas) and the ability of fishers to relocate.

Applicants should undertake early consultation with a cross-section of the fishing industry, as well as MMO, SNCBs, relevant Inshore Fisheries and Conservation Authorities (IFCAs), Defra and Welsh Government, to identify impacts, and actively encourage input from active fishers to provide evidence of their use of the area to support the impact assessments. Regarding offshore wind farms, updated EN-3 states that the Secretary of State should be satisfied that the site selection process has been undertaken in a way that reasonably minimises adverse effects on fish stocks. Where the Secretary of State considers the wind farm would significantly impede the protection of sustainable fisheries or fishing activity at recognised important fishing grounds, this should be attributed a correspondingly significant weight. The Secretary of State should also consider adverse or beneficial impacts on different types of commercial fishing on a case by case basis. The Secretary of State should be satisfied that the applicant has sought to design the proposal with relevant consultees, and tried to minimise the loss of any fishing activities. The Secretary of State will need to consider the extent to which disruption to the fishing industry has been mitigated where reasonably possible. Mitigation proposals should result from detailed consultation with relevant consultees (including where relevant inshore fishing groups), and mitigation should be designed to enhance where reasonably possible any potential medium and long-term positive benefits to the fishing industry, commercial fish stocks and the marine environment.

Applicants should establish stakeholder engagement with interested parties in the navigation sector early in the development phase of the proposed offshore wind farm and continue to ensure that solutions are sought that allow offshore wind farms and navigation uses of the sea to successfully co-exist. Assessment should be underpinned by consultation with relevant representatives. Applicants should also undertake a Navigational Risk Assessment in accordance with relevant Government guidance. The Secretary of State should not grant development consent in relation to the construction or extension of an offshore wind farm if it considers that intolerable interference with the use of recognised sea lanes essential to international navigation is likely to be caused by the development. The Secretary of State should be satisfied that the site selection has been made with a view to avoiding or minimising disruption or economic loss to the shipping and navigation industries with particular regard to approaches to ports and to strategic routes essential to regional, national and international

trade, lifeline ferries, and recreational users of the sea. Where the proposed development is likely to adversely affect major commercial navigational routes, the Secretary of State should give these adverse effects substantial weight in its decision making. Mitigation measures should be identified following proactive engagement with key sector representatives. Where less strategically important shipping routes are likely to be affected, a pragmatic approach should be adopted, with negative impacts minimised as low as reasonably practicable.

Regarding the impact on other offshore infrastructure, where the proposed wind farm is in close proximity to this infrastructure, the applicant should undertake an assessment of the potential effects of the proposed development on such infrastructure in accordance with updated EN-1. Early consultation between the applicant, the interested parties and the Secretary of State where relevant, should be held as early as possible in the process and continue throughout the lifetime of the project. Where a proposed offshore wind farm potentially affects other offshore infrastructure, the Secretary of State should expect the applicant to minimise negative impacts and reduce risks to as low as reasonably practicable. The Secretary of State should be satisfied that the site selection and site design of the offshore wind farm has been made with a view to avoiding or minimising disruption or economic loss or any adverse effect on safety to other offshore industries. Where a proposed development is likely to affect the future viability or safety of an existing or approved/ licensed offshore infrastructure or activity, the Secretary of State should give these adverse effects substantial weight in its decision making. Providing proposed schemes have been carefully designed, and that the necessary consultation with relevant bodies has been undertaken at an early stage, mitigation measures may be possible to negate or reduce effects on other offshore infrastructure to a level sufficient to enable the Secretary of State to grant consent.

Applicant assessments should include robust baseline data and detailed surveys of the effects on fish stocks of commercial interest, and any potential reduction or increase in such stocks that will result from the presence of the wind farm development and of any safety zones. The assessments should also provide evidence regarding any likely benefits or constraints on fishing activity within the project's boundaries.

In relation to the effect of Offshore Wind farms on other operators, updated EN-3 notes that developers should make reasonable efforts to demonstrate that they have worked to manage the impact of wake effects on other occupiers, drawing from assessments (where relevant) of the impact of wake effects by the proposed development on other nearby wind farms. This demonstration could include, for example, approaches such as explaining how the project configuration has been evolved during the design process to reduce the impact or avoid the most impactful configurations, or manage the planned layout of an offshore wind turbine array to select layouts with reduced long-distance wake impact on other occupiers. Note that there is no expectation on the Secretary of State to adjudicate on disputes between wind farms, or verify wake assessments.

Where a Pumped Hydro storage project is likely to have impacts on recreational activities the applicant should undertake a full assessment, accounting for the views of relevant representational bodies and taking measures to minimise adverse impacts. The Secretary of

State should be satisfied that these projects are designed to minimise, and where possible enhance, impacts on existing recreational activities.

In relation to Onshore Wind farms, it is noted that these can be combined on site with other activities. This could be, for example, with other generating technologies such as solar panels, or it could be some agricultural activities can still take place at the base of the turbines. The onshore wind farm should be laid out and construction methods should be designed to minimise soil and hydrology disturbance and hydrology during construction and maintenance of roads, tracks, and other infrastructure.

Quite often, wind farms are located in upland areas, or areas exposed to prevailing winds and this is frequently areas with high levels of peat. Applicants should undertake avoidance, management, mitigation or compensatory measures for impact on peatland habitats. For example, restoring disturbed peatland habitats and carrying out additional nature restoration on or off-site. Such measures would allow agricultural activities to continue.

Assessment made in respect of EN-3

The renewable technologies identified in updated EN-3 could have negative effects on economic activities such as commercial fishing, navigation, on recreational activities such as watersports, and on offshore infrastructure over all timeframes, of which some effects could carry substantial weight. However, there are some benefits, for example the interconnectors associated with offshore and onshore wind generation will deliver cheaper consumer costs; pumped hydro storage will provide storage of electricity for times when demand exceeds supply; and some of the infrastructure associated with solar photovoltaic generation may provide socio-economic benefits post operation. For all of the specific adverse effects identified, mitigation measures identified in consultation with relevant bodies should be adopted, and where possible specific effects should be taken into account in the design of the project. The assessment has shown that on balance minor negative impacts are expected over all timescales, given that the majority of adverse effects should be able to be mitigated.

Table 6-7: To promote a strong economy with opportunities for local communities Objective Summary

AoS Objective: To promote a strong economy with opportunities for local communities	**Technology**	**Assessment of non-generic effects (by timescale)**		
Guide questions: • Support enhanced security, reliability and affordability of the national energy supply?		S	M	L
	Offshore wind	**-/+**	**-/+**	**-/+**
	Pumped hydro storage	**-/+**	**-/+**	**-/+**

• Support creation of both temporary and permanent jobs and increase skills, particularly in areas of need? • Have wider socio-economic effects such as changes to the demographics, community services or house prices? • Delivery of infrastructure to support economic investment in the local economy?	Solar photovoltaic generation	**-/+**	**-/+**	**-/+**
	Onshore wind	**-/+**	**-/+**	**-/+**

AoS Objective 14: Promote sustainable use of resources and natural assets

Anticipated effects

EfW and biomass combustion generating stations will produce waste residues that require further management, much of which can be used for commercial purposes.

Generating stations that combust waste produce two types of residues: combustion residue-inert material from the combustion chamber; and fly ash, a residue from flue gas emission abatement technology. These two residues cannot be mixed.

Biomass combustion generating stations will also produce both combustion and flue gas treatment residues, however, these can be mixed and managed as one product for disposal.

Left unchecked, waste combustion generating stations may disadvantage reuse or recycling initiatives if the proposed development doesn't accord with the waste hierarchy and burns materials which should have been reused or recycled otherwise.

Approach to development and mitigation in updated EN-1 and updated EN-3

The applicant should undertake an assessment of the proposed waste combustion generating station that examines the conformity of the scheme with the management of waste in accordance with the waste hierarchy, the effect on the relevant Waste Local plans, and demonstrates that the proposed plant will not result in overcapacity of EfW treatment at a local and/or national level. The applicant should set out the extent to which the generating station and capacity proposed is compatible with and supports the statutory long-term residual waste reduction targets for England. Applicants should also consider the declining availability of residual waste arisings in context of the government's commitment to transition to a circular economy.

Where appropriate, reference should be made to the waste authorities' annual monitoring reports. Where EfW facilities are developed to enable the replacement of older, less efficient facilities, capacity should not necessarily be replaced like for like and must reflect updated waste management capacity needs. The Secretary of State should be satisfied that the proposed EfW plant is in accordance with the waste hierarchy, and of an appropriate type and scale so as not to prejudice the achievement of relevant waste management targets in England.

Updated EN-3 also notes that in line with Defra's policy statement, the Secretary of State should not grant development consent for further EfW plants in England unless satisfied that the proposal will help lower the amount of non-recyclable waste sent to landfill, or enable the replacement of older, less efficient facilities.

The Secretary of State should also be satisfied that proposals will not prevent recyclable materials, including those that may be recyclable in the future, being separated and sent for appropriate treatment. The Secretary of State should also be satisfied that a proposed EfW is feasible for the duration of its proposed lifecycle in light of declining residual waste volumes and will not be reliant on material that is recyclable.

Updated EN-3 notes that the Welsh Government has put in place a moratorium on all new EfW plants greater than 10MW generation capacity in Wales, therefore, no further EfW developments in Wales will be consented under EN-3.

The applicant should include the production and recovery or disposal of residues as part of the ES. In addition, applicants should set out the consideration they have given to the existence of accessible capacity in waste management sites for dealing with residues for the planned life of the power station. The Secretary of State should consult the Environment Agency on the suitability of the proposals for projects in England, and should consult NRW for projects in Wales. The Secretary of State should be satisfied that management plans for residue disposal satisfactorily minimise the amount that cannot be used for commercial purposes. The Secretary of State should give substantial positive weight to development proposals that have a realistic prospect of recovering residues. The Secretary of State should consider what requirements it may be appropriate to impose following consultation with the Environment Agency. In terms of mitigation, the environmental burdens associated with the management of combustion residues can be mitigated through recovery of secondary products, for example aggregate or fertiliser, rather than disposal to landfill. The Secretary of State should give substantial positive weight to proposals that have a realistic prospect of recovering these materials.

Assessment made in respect of updated EN-3

Biomass and combustion from waste could have a positive effect where it is in accordance with the waste hierarchy and is of an appropriate scale. A positive effect could also occur where the applicant is planning to recover much of the residual component. However, there could also be negative effects in terms of the residues that are produced from burning waste.

Table 6-8: Promote sustainable use of resources and natural assets Objective Summary

AoS Objective: Promote sustainable use of resources and natural assets	**Technology**	**Assessment of non-generic effects (by timescale)**		
Guide questions:		S	M	L
• Reduce consumption of materials, energy and resources? • Promote sustainable waste management practices in line with the waste hierarchy? • Encourage the use of recycled and / or secondary materials? • Encourage the development of a circular economy? • Promote the use of low carbon materials and technologies? • Produce waste by-products that require appropriate management? • Promote the use of local suppliers that use sustainably-sourced and locally produced materials?	Biomass and EfW	**- / +**	**- / +**	**- / +**

Cumulative effects – Updated EN-3

Offshore wind will have a hugely important role in supplying renewable energy. It is therefore highly likely that a number of offshore wind farms could be proposed in areas with good wind resources, such as the North Sea. Multiple offshore wind facilities could, potentially, result in cumulative effects on biodiversity, with impacts beyond identified thresholds for numbers of species and habitats. The updated EN-3, through the Offshore Wind Environmental Improvement Package, recognises that a more strategic approach may be required to assessment to address environmental barriers and maintain or enhance the environment while accelerating offshore wind deployment. It is also recognised that compensation measures may be required where adverse effects on site integrity cannot be ruled out, and that applicants should work collaboratively together where there are cumulative impacts from more than one development. Updated EN-3 also proposes that effects of multiple cable routes could be mitigated by cooperation between developers of these facilities. The cumulative impacts of underwater noise should be examined and a Site Integrity Plan developed and reviewed closer to the construction date, once there is more certainty over the equipment to be used. Further cumulative impacts are likely to relate to visual and seascape effects, skills and economy (through fishing impacts), shipping and navigation, and health and well-being effects resulting from visual impacts and impacts on employment (potentially positive or negative).

The Clean Power 2030 Action Plan sets out a deployment range for solar PV of between 45-47GW by 2030 (with scope to exceed this) and there is a potential that cumulative impacts may occur where solar farms are situated in proximity to other existing energy generating stations and infrastructure, to maximise existing grid infrastructure, thus minimising local effects and reducing costs. There may also be cumulative landscape and visual impacts with other existing or proposed infrastructure (such as onshore wind farms as noted in updated EN-3), particularly where the solar farm is located in a low lying area with good exposure. Cumulative transport assessments may also be needed where several energy infrastructure developments are proposed that use a common port or access route.

It is noted in updated EN-3 that the mass deployment of onshore wind farms is critical in meeting the Government's 2030 clean power pathway and that the Clean Power Action Plan estimates the need for 27-29GW of operational onshore wind capacity by 2030. Onshore wind farms would typically be located in upland areas, or those low lying areas with greater exposure to prevailing wind. Large scale wind farms (typically over thirteen turbines) would also be more likely in rural areas. Such upland, or exposed rural areas, would typically have a wider zone of visual influence than other types of onshore energy infrastructure. As such, there is a potential for adverse cumulative effects on landscape (and the setting of heritage assets) through clustering of such developments. As such, note is made in updated EN-3 that the approach to assessing cumulative landscape and visual impact of large-scale onshore wind farms is likely to be the same as assessing other large onshore energy infrastructure such as nuclear.

There could also be potential implications for power output from wind farms if developments are clustered – through loses generated by 'wake effect'. Updated EN-3 sets out the need for developers to make reasonable efforts to demonstrate that they have worked to manage the impact of wake effects on other occupiers, drawing from assessments (where relevant) of the impact of wake effects by the proposed development on other nearby wind farms.

Connecting onshore wind farms to the transmission network may also lead to cumulative effects and as such updated EN-3 notes that applicants must assess the cumulative impacts of situating an onshore wind farm in proximity to other energy generating stations and infrastructure. Clustering of wind farms could also result in cumulative adverse impacts on birds and bats e.g. by increasing overall disturbance, as well as the level of hazards / collision risk in flight paths.

Development of onshore wind farms is noted in updated EN-3 as having a potential for impact on transport networks and it is set out that where a cumulative impact is likely because multiple developments are proposing to use a common port and/or access route and pass through the same towns and villages, applicants should include a cumulative transport assessment as part of the ES.

Updated EN-3 also notes that onshore wind farms have the potential to increase the biodiversity value of a site, especially if the land was previously intensively managed. In some instances, this can result in significant benefits and enhancements beyond Biodiversity Net

Gain, which result in wider environmental gains which is encouraged. As such, these could be considered cumulative benefits.

Where EfW facilities are clustered, the effects are considered to be similar to those outlined for biomass combustion above. Since these facilities would not necessarily be located at or near ports, the potential impact on traffic and transport from additional HGV movements inland would be increased, unless rail transport is used.

Cumulative effects are likely to be experienced as a result of development of any of the technologies discussed in updated EN-3 (onshore wind, offshore wind and biomass/energy from waste) with the effects of related transmission lines addressed in updated EN-5. Adverse cumulative effects are, therefore, likely to be experienced in the short term in relation to air quality, dust, noise, landscape and visual effect, traffic and transport and noise. Visual impact of the renewable energy facilities and transmission lines are also cumulative. There are potential benefits from development of renewable energy facilities and transmission lines to these facilities. These are in relation to employment with potentially linked impacts on health and well-being and equality.

It is also the case that these facilities would need to comply with the regulatory emissions limits or other controls, though some effects would likely remain. Further cumulative impacts in the short, medium and long term (up to 35 years, depending on the design life of the facilities) may include:

- adverse noise and vibration impacts;
- adverse traffic and transport impacts, especially if residues are not transported by rail or water;
- adverse water resource and water quality impacts relating to the large water demands, especially during low flow or drought periods;
- positive impacts on skills and economy if numerous skilled employment opportunities develop to support these facilities;
- adverse impacts on visual effects;
- adverse impacts on health and well-being from the noise and vibration effects;
- positive health and well-being effects as a consequence of increased employment and possible development of supporting skills for the facilities;
- for facilities with CHP, the health and well-being impacts may be increased since these facilities would be located close to communities.

It should also be noted that for the most part, renewable technologies should result in no air emissions when operational, except for those that rely on combustion of biomass or waste as discussed above. As more such developments come online, this could have the beneficial cumulative effect of improving air quality at a local, regional or national level, as well as reducing overall carbon emissions for the nation.

Summary of key findings of appraisal of updated EN-3

Renewable energy infrastructure development has similar generic strategic effects to other types of energy infrastructure. Such effects result from impacts associated with location of large facilities at single sites. For the majority of the AoS objectives, the generic strategic effects of updated EN-3 are considered to be aligned with those identified in updated AoS-1.

There are a number of specific effects associated in particular with eight AoS objectives: Carbon emissions, Biodiversity; Landscape/ Seascape; Water Quality; Air Quality; Health; Economy; and Resources. These effects have been found to be generally negative across short, medium and long terms.

Consistency with the national target of reducing carbon emissions to Net Zero by 2050 is considered minor negative over the short and medium term reflecting residual emissions from biomass and EfW plants installed with CCR, followed by neutral effects in the long term as CCR plants have CCS installed.

Significant effects from renewable technologies can potentially affect biodiversity, landscape/ seascape, noise, commercial fishing, and commercial navigation routes. However, the effects are uncertain at this level of appraisal, as the actual effects are dependent on the sensitivity of the environment and the location and design of infrastructure.

There are, however, a few positive specific effects associated with the technologies. Positive effects may occur on the fishing industry from offshore wind farms; on biodiversity from solar farms, where land is no longer managed intensively; on biodiversity from pumped hydro storage schemes, as a result of habitat creation and fish re-stocking; on biodiversity from onshore wind farms (where opportunities are taken for enhancement) and on resources where residues from biomass or energy from plants can be recovered and re-used rather than being sent to landfill. Again, there is uncertainty associated with these effects at this level of appraisal.

Updated EN-1 (informed by updated AoS-1) includes extensive mitigations to ensure these effects are considered by applicants and the Planning Inspectorate when preparing and determining applications. Update EN-3 (informed by updated AoS-3) contains a range of specific mitigation measures, along with those proposed in updated EN-1, which seek to address the range of non-generic negative effects identified. In some cases, such as for noise impacts, which are included under the Health AoS objective, it is recognised that the effect may not be able to be mitigated completely. Overall, it is considered that residual negative but uncertain effects will remain for the AoS objectives considered.

It should be noted, however, that these technologies have an important role to play in meeting the UK's energy needs and supporting delivery towards the UK's net zero target, and updated EN-3 notes that the benefits of meeting this target may outweigh some negative effects.

A summary of the likely non-generic effects arising specifically from renewable energy infrastructure is set out in the following Tables 6-9 to 6-14.

Table 6-9: Summary of key AoS findings – Biomass and energy from waste

AoS Objective	Assessment of non-generic effects (by timescale)		
	S	M	L
Consistent with the national target of reducing carbon emissions to Net Zero by 2050	**-**	**-**	**0**
Protect and enhance the character and quality of the landscapes, townscapes and waterscapes and protect and enhance visual amenity	**-**	**-**	**-**
Protect and enhance air quality on a local, regional, national and international scale	**-**	**-**	**-**
Improve health and well-being and safety for all citizens and reduce inequalities in health	**-**	**-**	**-**
Promote sustainable use of resources and natural assets	**-/+**	**-/+**	**-/+**

Table 6-10: Summary of key AoS findings – Offshore wind

AoS Objective	Assessment of non-generic effects (by timescale)		
	S	M	L
Enhance biodiversity and ecological networks, deliver biodiversity net gain, protect and support ecosystem resilience and functionality	**-**	**-**	**-**
Protect and enhance the character and quality of the landscapes, townscapes and waterscapes and protect and enhance visual amenity	**-**	**-**	**-**
To promote a strong economy with opportunities for local communities	**-/+**	**-/+**	**-/+**

Table 6-11: Summary of key AoS findings – Pumped Hydro

AoS Objective	Assessment of non-generic effects (by timescale)		
	S	M	L
Enhance biodiversity and ecological networks, deliver biodiversity net gain, protect and support ecosystem resilience and functionality	**-**	**-/+**	**-/+**
Protect and enhance the character and quality of the landscapes, townscapes and waterscapes and protect and enhance visual amenity	**-**	**-**	**-**

Improve health and well-being and safety for all citizens and reduce inequalities in health	**--**	**--**	**-**
To promote a strong economy with opportunities for local communities	**-/+**	**-/+**	**-/+**

Table 6-12: Summary of key AoS findings – Solar Photovoltaic

AoS Objective	**Assessment of non-generic effects (by timescale)**		
	S	M	L
Enhance biodiversity and ecological networks, deliver biodiversity net gain, protect and support ecosystem resilience and functionality	**-**	**-/+**	**-/+**
Protect and enhance the character and quality of the landscapes, townscapes and waterscapes and protect and enhance visual amenity	**-**	**-**	**-**
Improve health and well-being and safety for all citizens and reduce inequalities in health	**-**	**-**	**-**

Table 6-13: Summary of key AoS findings – Tidal Stream Energy

AoS Objective	**Assessment of non-generic effects (by timescale)**		
	S	M	L
Enhance biodiversity and ecological networks, deliver biodiversity net gain, protect and support ecosystem resilience and functionality	**-**	**-**	**-**
Protect and enhance the character and quality of the landscapes, townscapes and waterscapes and protect and enhance visual amenity	**-**	**-**	**-**

Table 6-14: Summary of key AoS findings – Onshore wind

AoS Objective	**Assessment of non-generic effects (by timescale)**		
	S	M	L
Enhance biodiversity and ecological networks, deliver biodiversity net gain, protect and support ecosystem resilience and functionality	**-/+**	**-/+**	**-/+**

Protect and enhance the character and quality of the landscapes, townscapes and waterscapes and protect and enhance visual amenity	--	--	--
Improve health and well-being and safety for all citizens and reduce inequalities in health	-	-	-
To promote a strong economy with opportunities for local communities	-/+	-/+	-/+

Appraisal of Alternatives – Updated EN-3

Introduction

The scope and methods of appraisal of alternatives are detailed in updated AoS-1. The strategic alternative identified for renewable energy infrastructure were assessed using Sustainable Development themes that better keep the appraisal at the higher and strategic level. The results are set out below.

Note that in consideration of Alternatives, the assessment is undertaken in comparison to updated EN-3. As such, the findings of the AoS in respect of updated EN-3 broadly apply to the alternative – the key differentiator being the inclusion or absence of particular aspects related to the Technology and the relative outcomes of such inclusion or absence. To draw comparison between the alternative and EN-3 on a broad level, the following scale has been used.

Table 6-15: Differentiator scale for Alternatives

Scale	Description
Large Positive	A materially different positive outcome is anticipated compared to updated EN-3
Positive	A more positive outcome is anticipated compared to updated EN-3
Neutral	This alternative is anticipated to have the same outcome as updated EN-3
Negative	A more adverse outcome is anticipated compared to updated EN-3
Large Negative	A materially different adverse outcome is anticipated compared to updated EN-3

Appraisal results

The findings of the appraisal of the strategic alternatives for updated EN-3 are set out below, arranged by Sustainable Development (SD) theme. Note is made that a new alternative (EN 3 (b)) has been identified for updated EN-3 due to the inclusion of Onshore Wind in the updates of both EN-1 and EN-3.

The alternatives under consideration are:

- EN3 (a): only consent Biomass/ EfW plant with Combined Capture and Storage (CCS)
- EN3 (b): not consent Onshore Wind

Climate change (Net Zero)

Alternative (a) only consenting biomass or waste combustion plant with CCS has the potential to further reduce CO2 emissions from biomass or waste combustion plant compared with updated EN-3. However, the commercial viability will need to be demonstrated at a larger scale in the UK, although CCS in conjunction with biofuels is being deployed at small scale in Europe. The need for scale increases the challenges in demonstrating economic viability but this alternative in conjunction with sustainable biomass could be beneficial in meeting Net Zero targets. However, this assessment is highly uncertain and would depend on what happens to the waste if not used within the power sector (as energy recovery from residual waste has a lower greenhouse gas impact than landfill) and the extent to which biomass may be more cost effective in decarbonising other sectors (such as heat and transport) over the long-term.

Alternative (b) not consenting onshore wind has the potential to compromise the achievement of the carbon reduction targets set in Clean Power 2030 and Net Zero by 2050.

Headline SD theme	**Updated EN-3**	**Alternative (a)**	**Alternative (b)**
Climate Change (Net Zero)		Positive / Negative	Negative

Security of energy supply

Alternative (a), only consenting biomass/ waste combustion plant with CCS, may result in fewer proposals coming forward for such plant in the short term, given that developers will need to be confident of economic viability as CCS as yet to be proven at scale in the UK. This could have a negative effect on security of supply but given the relatively small capacity provided by these technologies may not be material.

Alternative (b) not consenting onshore wind has the potential to compromise security of supply as energy produced by other technologies may not be sufficient to meet the nation's need.

Headline SD theme	**Updated EN-3**	**Alternative (a)**	**Alternative (b)**
Security of energy supply		Negative	Negative

Health and well-being

Alternative (a), only consenting biomass or waste combustion plant with CCS, could potentially change effects on health and well-being compared with EN-3. There may be increases in emissions of air pollutants as a result of the CCS technology required to be used, although there are unlikely to be changes in noise associated with the plant. Alternative (a) may also

increase negative effects on health and well-being on a wider regional and national scale if security of energy supply cannot be maintained, and this has impacts on employment opportunities and economic growth. However, if CCS is demonstrated to be economically viable on a larger scale, then impacts on health and well-being are likely to be more positive through increased employment opportunities associated with CCS technology.

Alternative (b) not consenting onshore wind has the potential to impact health and wellbeing negatively as reliance may need to be put on more polluting energy generating technologies such as biomass and natural gas.

Headline SD theme	Updated EN-3	Alternative (a)	Alternative (b)
Health and well-being		Positive / Negative	Negative

The economy

Alternative (a), only consenting biomass or waste combustion plant with CCS is likely to result in reduced benefits to the economy compared with updated EN-3 under current market conditions. Fewer proposals are likely to come forward, given that investors will need to be confident of the economic viability of CCS, unless incentives are provided. A reduced electricity generating capacity is also likely to increase reliance on more expensive energy generating technologies such as nuclear in the transition to a low carbon economy or require an even faster expansion of renewables that may not be achievable within the required timescales, and therefore potentially increase energy bills to consumers. However, if CCS in conjunction with sustainable biomass plants and waste-to-energy plants are demonstrated to be economically viable on a larger scale, then the positive effects on the economy are likely to be greater than with the adoption of updated EN-3. This is related to greater employment opportunities in CCS and the likelihood that energy bills will be lower in the transition to a low carbon economy if there is more electricity generating capacity with CCS.

Alternative (b) not consenting onshore wind has the potential to impact the economy negatively as energy produced by other technologies may not be sufficient to meet the nation’s need. A reduced electricity generating capacity is likely to increase reliance on more expensive energy generating technologies such as nuclear in the transition to a low carbon economy or require an even faster expansion of other renewables (offshore wind and solar) that may not be achievable within the required timescales, and therefore potentially increase energy bills to consumers.

Headline SD theme	Updated EN-3	Alternative (a)	Alternative (b)
The economy		Positive / Negative	Negative

The built environment

Alternative (a), only consenting biomass or waste combustion plant with CCS, may result in reduced negative effects on the built environment compared with updated EN-3. This alternative is likely to result in fewer proposals for these types of plant and therefore likely to result in reduced negative effects on flood risk (plant tend to be located in coastal areas or estuarine sites where flood risk is elevated). There are also likely to be reduced negative effects on traffic and transport, although those that remain, as with updated EN-3, are likely to be localised and short term in duration associated with construction and decommissioning. Effects on townscapes, archaeology and cultural heritage with adoption of alternative (a) are also likely to be less negative compared with updated EN-3, again associated with likely fewer generating stations, although those that remain are again likely to be local in extent. However, if CCS is demonstrated to be economically viable on a larger scale, then negative impacts on the built environment are likely to be larger compared with adoption of updated EN-3, because the footprint of plant with CCS is greater than that of plant without CCS.

Alternative (b) not consenting onshore wind may result in reduced negative effects on the built environment compared with updated EN-3. This alternative is likely to result in fewer proposals for these types of plant and therefore likely to result in reduced negative effects on townscapes. Effects on archaeology and cultural heritage with adoption of alternative (b) are also likely to be less negative compared with updated EN-3, again associated with likely fewer generating stations, although those that remain are again likely to be local in extent.

Headline SD theme	**Updated EN-3**	**Alternative (a)**	**Alternative (b)**
The built environment		Positive / Negative	Positive

The natural environment

Alternative (a), only consenting biomass or waste combustion plant with CCS, may result in reduced negative effects on the natural environment compared with updated EN-3. This alternative is likely to result in fewer proposals for such electricity generating stations and therefore likely to result in reduced negative effects on biodiversity as there will be less land take. Effects on landscape and visual character are also likely to be less than would be the case with updated EN-3, again because there will be less land take. Those effects that remain are likely to be local in extent. However, if CCS is demonstrated to be economically viable on a larger scale, then impacts on the natural environment are likely to be of greater negative magnitude compared with adoption of updated EN-3 as there will potentially be more land take.

Alternative (b) not consenting onshore wind may result in reduced negative effects on the natural environment compared with updated EN-3. This alternative is likely to result in fewer proposals for these types of plant and therefore likely to result in reduced negative effects on landscape and visual character. Effects on biodiversity, archaeology and cultural heritage with adoption of alternative (b) are also likely to be less negative compared with updated EN-3,

again associated with likely fewer such generating stations, although those that remain are again likely to be local in extent.

Headline SD theme	Updated EN-3	Alternative (a)	Alternative (b)
The natural environment		Positive / Negative	Positive

Summary of alternatives findings and preferred approach for the NPS

Headline SD themes	Updated EN-3	Alternative (a)	Alternative (b)
Climate Change (Net Zero)		Positive / Negative	Negative
Security of Energy Supply		Negative	Negative
Health & Well-Being		Positive / Negative	Negative
The Economy		Positive / Negative	Negative
The Built Environment		Positive / Negative	Positive
The Natural Environment		Positive / Negative	Positive

Alternative (a), only consenting biomass or waste combustion plant with CCS, could be beneficial in meeting Net Zero targets. However, there is uncertainty depending on what happens to the waste if not used within the power sector (as energy recovery from residual waste has a lower greenhouse gas impact than landfill) and the extent to which biomass may be more cost effective in decarbonising other sectors (such as heat and transport) over the long-term. The requirement to demonstrate the economic viability on a larger scale for CCS than required under updated EN-3 may result in fewer applications for development consent which could in turn negatively impact Security of Supply and affordability of energy but given the relatively small capacity provided by these technologies may not be material. Widening the CCS requirement to all biomass or waste combustion plant could carry significant risks while (as at present) the technology remains unproven at large scale and it is unclear how much it will cost to install and operate and may also present economic barriers to developers. There may be even more uncertainty associated with waste combustion plant. Alternative (a) could also have greater positive effects on the Economy than updated EN-3 associated with the greater potential for employment with CCS and a positive impact in lowering energy prices. However, there are uncertainties associated with these positive effects from alternative (a).

Across the remaining sustainable development themes (Health & Well-Being, Built Environment and Natural Environment), the adoption of alternative (a) compared with updated EN-3 could therefore result in either greater positive or negative effects. Where CCS economic viability is not demonstrated on a wider basis, then there are likely to be smaller negative effects compared with updated EN-3. This is related to reduced land use as well as reduced footprint on health and well-being resulting from the narrower application of sustainable biomass/ waste plant with CCS. Where CCS viability is demonstrated on a wider basis for

electricity generating capacity, then there are likely to be greater negative effects on these same topics.

The key difference between this alternative and updated EN-3 would seem to be a benefit for the achievement of Net Zero due to reduction of emissions from EfW and also biomass. This assessment is highly uncertain and would depend on what happens to the waste if not used within the power sector (as energy recovery from residual waste has a lower greenhouse gas impact than landfill) and the extent to which biomass may be more cost effective in decarbonising other sectors (such as heat and transport) over the long-term. However, the use of CCS with biomass and energy from waste could present a more sustainable alternative than the policies set out in updated EN-1 and updated EN-3, if implemented in a way which minimises unintended consequences.

Alternative (b), not consenting onshore wind, could be detrimental in meeting Net Zero targets as reliance would need to be replaced on other energy generating technologies with a higher carbon footprint. Alternative (b) could also be detrimental to Security of Supply, the Economy and Health and Wellbeing as it may compromise security of supply with a knock on effect on the economy and increase energy bills for consumers.

Across the remaining sustainable development themes (Built Environment and Natural Environment), the adoption of alternative (b) compared with updated EN-3 could deliver better protection for landscapes, townscapes and visual amenity as well as biodiversity, archaeology and cultural heritage.

The key differences between this alternative and updated EN-3 are potential benefits for the Built and Natural Environment but disbenefits for Climate Change, Security of Supply, Health and Wellbeing and the Economy. The inclusion of onshore wind in updated EN-3 is therefore the preferred approach as it will help decarbonise the electricity system quicker and achieve net zero targets, diversify the energy mix with less reliance on fossil fuels hence enhancing security of supply and through being one of the cheapest forms of renewable energy generation will contribute to lowering electricity costs and energy bills.

6. Assessment for Electricity Networks Infrastructure (updated EN-5)

Introduction

The NPS for Electricity Network Infrastructure (EN-5), in conjunction with the Overarching NPS for Energy (EN-1), sets out the relevant planning factors that should be considered by the Secretary of State when determining whether development consent should be granted for a proposed scheme. As for updated EN-1, updated EN-5 has been developed via an iterative process, taking account of the appraisal of the predicted sustainability effects both for updated EN-5 preferred polices and reasonable alternatives.

Appraisal findings for updated EN-5

Electricity networks infrastructure may have various impacts on communities and the environment depending on the nature of the development and its location. As noted in updated EN-5, all the generic impacts detailed in updated EN-1 are likely to be relevant to electricity network infrastructure, even if only during specific stages of the development (such as construction), or at one specific part of the development (such as a substation).

While reference should be made to updated AoS-1 for consideration of all generic sustainability effects in full, this section of the AoS focuses on those potentially significant sustainability effects associated with the technologies set out in updated EN-5 (henceforth referred to as non-generic effects). The non-generic effects considered relate to the following AoS Objectives:

- Reducing Carbon Emissions to Net Zero (with regard SF6) – AoS Objective 1;
- Biodiversity and Geological Conservation- AoS Objective 3;
- Landscape and Visual – AoS Objective 6; and
- Health and Well Being and Safety of all Citizens (including electro-magnetic fields and noise and vibration) – AoS Objective 11.

The likely significant effects of the technology specific policies, requirements and guidance in updated EN-5 have been appraised against the corresponding objectives in the AoS framework as set out above.

The results of the assessment of likely significant effects are scored using the table below.

Table 7-1: Key to appraising significance of effects – EN-5

Likely significance of effects

Significant positive effect likely	**+++**	Policy is expected to address an existing sustainability problem (for example air pollution) or deliver sustainability enhancements, such as substantial environmental net gain above existing/emerging policy.
Minor positive effect likely	**+**	Policy is expected to lead to environmental net gain in line with existing or emerging Government policy OR result in protection and conservation of a sustainability asset (for example, a designated biodiversity site or designated heritage asset).
No effect likely or not applicable	**0**	No perceptible effects expected, or the objective is not relevant to the part of the NPS being assessed.
Minor negative effect likely	**-**	Policy is expected to result in adverse effects of a lower magnitude or smaller scale, which can be mitigated through standard measures and best practice.
Significant negative effect likely	**--**	Policy is expected to result in adverse effects of a greater magnitude or larger scale, which cannot be mitigated OR will require extensive and bespoke mitigation solutions (further studies may be required to identify appropriate solutions).

The appraisal focused on the identification of technology non-generic effects with consideration of generic mitigation measures as set out in updated AoS-1, in order to establish whether additional mitigation would be required to address anticipated effects of implementing EN-5.

The likely non-generic effects arising specifically from electricity network infrastructure are presented together with a summary of the residual non-generic effects of EN-5 for each relevant AoS objective over the short, medium and long term. In this context, for the purposes of the appraisal, the “short term” has been defined as the effects arising generally during the infrastructure construction period typically 2-7 years (different technologies have different construction times); the “medium term” as typically between 5 and 30 years (operational lifetimes vary with the characteristics of different technologies); and the “long term” as beyond 30 years (and including decommissioning where relevant). It is to be noted that updated EN-5 sets out that decommissioning of electricity networks is not covered, as it is generally understood that nationally significant electricity networks are not likely to be decommissioned, but to instead have an ongoing function.

In addition, consideration is given to the cumulative effects associated with the adoption of updated EN-5.

Centralised Strategic Network Planning

Updated EN-5 sets out that a strategic approach to network planning is essential. This will be undertaken through the Holistic Network Design (HND) and associated follow up exercises, along with the Centralised Strategic Network Plans (CSNP). It is the intention that this approach will help reduce the overall impact of infrastructure by identifying opportunities for

coordination, where appropriate, and taking a holistic view of both the onshore and offshore network.

The CSNP will provide an independent, long-term approach out to 2050 on how the transmission network should develop to meet energy security and decarbonisation goals. It will be delivered by the National Energy System Operator (NESO) and regulated by Ofgem. The first CSNP will be delivered in 2027.

Infrastructure that is set out within the CSNP process, will be published on the NESO's website following public consultation and once all stages of the CSNP Strategic Environmental Assessment (and any other environmental assessments, including HRA, for specific designated sites identified) for that CSNP are adopted. It is also important to note that where the CSNP endorses the need case for new transmission infrastructure, updated EN-5 endorses the work undertaken in the CSNP to assess a range of possible options to address network needs, and points out that these options would have already been assessed on the grounds of environmental impacts, community impacts, economic cost, deliverability and operability criteria. Updated EN-5 therefore accepts the proposed strategic parameters for proposed network infrastructure outlined in the CSNP. This could mean, but is not limited to, the choice of onshore overhead High Voltage Alternating Current lines, or the use of offshore High Voltage Direct Current cabling. Where a strategic solution is proposed in the CSNP, the choice of strategic solution does not need to be re-examined. Nevertheless, the choice of strategic solution must be consistent with applicable Sections of updated EN-1 and updated EN-5, for example with regards to undergrounding in certain designated landscapes.

Therefore, as the sustainability effects of such CSNP proposed infrastructure developments are addressed as part of the CSNP process, this AoS does not need to consider those aspects further. For the purposes of this assessment, it is anticipated that the precise location of any infrastructure related to updated EN-5 is not known at this stage – it is to be noted that in relation to CSNP, while there may be indicative routing between recommended infrastructure, routing decisions will be confirmed during the Detailed Network Design process in accordance with appropriate surveys and consultation. As such, routes are subject to change and should not be considered fixed for planning purposes.

AoS Objective 1: Consistent with the national target of reducing carbon emissions to Net Zero by 2050

Anticipated effects

Electricity networks are needed to connect the output of other types of electricity infrastructure with consumers and with each other. Therefore, as new generation, storage and interconnection facilities are built, the need to build the electricity networks that connect these sources of electricity with each other, and with centres of consumer demand will increase.

Specifically, the significant number of additional connections to the electricity grid that are required will result in a rise in the number of electrical switches and circuit breakers that are

needed to prevent serious accidents. Collectively, these safety devices are called switchgear. The vast majority use Sulphur Hexafluoride (SF6) gas to quench arcs and stop short circuits.

SF6 is an extremely potent and persistent greenhouse gas with the highest global warming potential (GWP) of any known substance. It is 23,500 times more warming than CO2 and therefore of concern in light of the UK's commitment to net zero by 2050.

The most important means by which SF6 gets into the atmosphere is from leaks in the electricity industry. Across the entire UK network of power lines and substations, there are around one million kilograms of SF6 installed. A study from the University of Cardiff found an average SF6 emission level of 1149 kg per year for England, Scotland, and Wales combined in the period 2010-16 and that the amount of SF6-insulated distribution equipment on the network increased steadily, with an average increase of 9401 kg of SF6 being introduced into the power distribution network every year. In the year 2015–2016, the total amount of SF6 used on the electrical network was approximately 1,119,880 kg and the amount of SF6 released into the atmosphere was approximately 11,320 kg which is the equivalent of 258,110 tonnes of CO2 being released into the environment11.

This rise was also reflected across Europe with total emissions from the 28 member states in 2017 equivalent to 6.73 million tonnes of CO2 (equivalent to the emissions from 1.3 million extra cars on the road for a year) and representing an increase of 8.1% year over year[12].

Unlike CO2, SF6 emissions cannot be sequestered from the atmosphere, so the only option is to eliminate the use of SF6 altogether. There are, however, currently no commercially viable alternative gases to SF6 and so it tends to be replaced, when necessary, on a like for like basis. The industry is actively looking for environmentally friendly solutions and trials in this area have shown that certain fluorinated gas mixtures that also have less greenhouse gas potential than SF6 and 'clean air solutions' can replace SF613 . One example is National Grid who have an ongoing programme of leak repair and mitigation of older equipment to reduce emissions, helping to contribute to their ambition to reduce emissions of the gas from their networks by 50% by 2030[14].

Approach to development and mitigation as set out in updated EN-1 and updated EN-5

Whilst updated EN-1 does not refer specifically to SF6 emissions, updated EN-5 details that the climate-warming potential of SF6 is such that applicants should, at the design phase of the process, consider carefully whether the proposed development could be reconceived to avoid the use of SF6 reliant assets. Updated EN-5 notes that as a rule, applicants should avoid the use of SF6 in new developments with the Secretary of State only granting consent for an electricity networks development if the applicant has demonstrated either that i) the

[11] https://www.mdpi.com/1996-1073/11/8/2037
[12] https://www.eea.europa.eu/data-and-maps/daviz/fluorinated-gases-f-gases-emissions-5#tab-googlechartid_chart_31
[13] https://www.siemens-energy.com/global/en/news/magazine/2020/alternatives-for-sf6.html

[14] What is SF6? | Sulphur hexafluoride explained | National Grid Group

development will not use SF6; or iia) that there is no proven commercially available alternative to the use of SF6, and iib) that a bespoke alternative would be grossly disproportionate in terms of cost, and iic) that emissions monitoring and control measures compliant with the F-gas regulations or their successors are in place.

Assessment made in respect of updated EN-5

In light of the policy in updated EN-5 as set out above, which indicates a clear preference for avoidance of the use of SF6 and their replacement for SF6-free alternatives, the non-generic effects of updated EN-5 are considered minor negative reflecting residual SF6 emissions from continued use of SF6, in the cases where no proven SF6-free alternative is commercially available or the cost of procuring a bespoke alternative is disproportionate. These cases are expected to become rarer as the use of alternative gases will most likely become the norm over time.

Table 7-2: Consistent with the national target of reducing carbon emissions to Net Zero by 2050

AoS Objective: Consistent with the national target of reducing carbon emissions to Net Zero by 2050	**Assessment of non-generic effects (by timescale)**		
Guide questions: • Reduction of the carbon emissions of the national portfolio of major energy infrastructure? • Reduction of direct and indirect emissions of all greenhouse gases, including carbon dioxide, during construction, operation and decommissioning? • Supply of energy from low carbon/renewable energy sources / use of low carbon/renewable energy? • Use carbon removals to offset residual emissions from energy such Negative Emissions Technologies (NET) and Nature Based Solutions (NBS)? • Creation of new carbon sinks/removals through natural sequestration including that by natural habitats, blue-green infrastructure and soils? • Support an energy system consistent with reducing carbon emissions to Net Zero by 2050 and long term emphasis on electrification of Clean Power 2030?	S	M	L
	-	-	-

AoS Objective 3: Enhance biodiversity and ecological networks, deliver biodiversity net gain, protect and support ecosystem resilience and functionality

Anticipated effects

The linear and often long distance nature of overhead transmission lines has the potential to affect designated and non-designated ecology over a large area through, for example, disturbance and terrestrial habitat loss and fragmentation during construction and operation. A particular anticipated effect is bird collisions with overhead transmission lines, in particular for large bird species such as swans and geese which sometimes collide with overhead line conductors in poor visibility, resulting in their injury or death. This risk is greater when overhead power lines intersect migration routes and/or the breeding and feeding grounds of bird species. Large raptors sometimes use power lines and pylons as vantage points for hunting, which can also result in electrocution if they touch more than one line at once. Perching birds can be killed as soon as their wings touch energised parts of the infrastructure. Another issue is that high voltage overhead lines can generate noise under certain conditions, which could have negative effects on wildlife and biodiversity.

When transmission lines are placed underground (instead of over ground), additional issues arise during construction as to match overhead line performance several separate cables in several separate trenches may be needed, resulting in an enlarged intervention area. Clearance of vegetation along and to the side of trenches to allow for construction and associated access for vehicles may result in temporary loss of habitat for terrestrial species and where transmission lines cross rivers, cables may be placed in ducts on river beds, and any necessary river diversions may result in significant local impacts for aquatic wildlife.

Transmission lines over the sea bed and foreshore result in the loss of habitat due to foundations and associated seabed preparation during construction; habitat disturbance from construction and maintenance/repair vessels; increased suspended sediment loads during construction and from maintenance/repair; potential impacts from EMF on benthic fauna; and potential for invasive/non-native species introduction.

Approach to development and mitigation as set out in updated EN-1 and updated EN-5

Updated EN-1 sets out comprehensive provisions for the protection of biodiversity of Energy NSIP proposals through requiring the applicant to set out any effects on internationally, nationally, and locally designated sites of ecological or geological conservation importance (including those outside England and Wales), on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity, including irreplaceable habitats. Specifically, updated EN-1 also sets out that the design of such proposals will need to consider the movement of mobile / migratory species such as birds, fish and marine and terrestrial mammals and their potential to interact with infrastructure.

Depending on the location, this also includes the consideration of potential effect on mobile and migratory species across the UK and more widely across Europe (transboundary effects).

Updated EN-5 follows through the issue of bird collision with overhead transmission lines and notes that the applicant will need to consider whether the proposed line will cause such problems at any point along its length and take this into consideration in the preparation of the Environmental Statement as part of Environmental Impact Assessment. Particular consideration is required to be given to feeding and hunting grounds, migration corridors and breeding grounds, where they are functionally linked to sites designated or allocated under the 'national site network' provisions of the Conservation of Habitats and Species Regulations. Mitigation has been listed in updated EN-5 and includes:

- Careful siting of a line away from, or parallel to, but not across, known flight paths can considerably reduce the numbers of birds colliding with overhead lines.
- Making lines more visible by methods such as the fitting of bird flappers and diverters to the earth wire, which swivel in the wind, glow in the dark and use fluorescent colours designed specifically for bird vision can also reduce the number of deaths.
- The design and colour of the diverters will be specific to the conditions – the line and pylon/transmission tower specifications and the species at risk.
- Electrocution risks can be reduced through the design of tower crossarms, insulators and the construction of other parts of high voltage power lines so that birds find no opportunity to perch near energised power lines on which they might electrocute themselves.

Although updated EN-5 does not specifically address the potential adverse noise effects of high voltage overhead lines on wildlife and biodiversity, this is considered to be covered under the provisions for Noise and Vibration in updated EN-1 where it is stated that noise effects of the proposed development on ecological receptors should be assessed by the Secretary of State.

Updated EN-5 recognises that cases will arise where – though no part of the proposed development crosses a designated landscape – a high potential for widespread adverse landscape and/or visual impacts along certain sections of its route may result in recommendations to use undergrounding or subsea options and requires consideration of the potentially very disruptive effects of undergrounding on local communities, habitats, archaeological and heritage sites, soil, geology, and, for a substantial time after construction, landscape and visual amenity. (Undergrounding an overhead line will mean digging a trench along the length of the route, and so such works will often be disruptive – albeit temporarily – to the receptors listed above than would an overhead line of equivalent rating).

Equally, the potentially very disruptive effects of subsea cables on the seabed and the species that live in and on it, including physical damage to and full loss of seabed habitats will require consideration. Cable protection can also be required where cables cross each other, or where they cannot be buried deep enough to protect them from becoming exposed. Such protection causes additional impacts that are often greater than those of the cable itself due to the large

areas covered. There can also be issues where subsea cables make landfall, as much coastal land is protected habitat with environmental and heritage designations and landfall connections could cause additional disruption to coastal communities and the environment.

Updated EN-1 sets out that Energy NSIP proposals, whether onshore or offshore, should also seek opportunities to contribute to and enhance the natural environment by providing net gains for biodiversity where possible. Updated EN-5 further supplements this generic guidance through recognising that the linear nature of electricity networks infrastructure can allow for excellent opportunities to reconnect important terrestrial habitats via green corridors, biodiversity stepping zones, and reestablishment of appropriate hedgerows; and/or connect people to the environment, for instance via footpaths and cycleways constructed in tandem with environmental enhancements.

Assessment made in respect of updated EN-5

Updated EN-5 clearly recognises that migratory and feeding birds sometimes collide with overhead line conductors in poor visibility, resulting in their injury or death and that large raptors can also be accidently electrocuted when using power lines and pylons as vantage points to hunt. Mitigation measures for these technology-specific effects set out in updated EN-5 include the careful planning and design of overhead power lines so that they avoid migration routes and feeding/ breeding areas as well as providing alternative areas for large raptors to perch.

Updated EN-5 also acknowledges the effects of undergrounding and subsea options on biodiversity and sets out mitigation measures to address these.

The significance of the effects and the effectiveness of the mitigation identified will depend upon the specific sensitivities of the location of the electricity network infrastructure together with details of design and site layout. This will be addressed alongside wider effects on biodiversity during the project level HRA and EIA assessments as set out in updated EN-1 to the satisfaction of the Secretary of State. In addition, any electricity network infrastructure that is set out within the new CSNP process will be subject to CSNP Strategic Environmental Assessment (and any other environmental assessments for specific designated sites identified) so it is expected that the ultimate choice of electricity network infrastructure will be the most sustainable and the proposed strategic parameters for proposed network infrastructure outlined in the CSNP will be adopted by the applicant. Nevertheless, the choice of strategic solution must be consistent with applicable Sections of updated EN-1 and updated EN-5, for example with regards to undergrounding in certain designated landscapes.

As such, it is appraised that the non-generic effect of enabling the development of new electricity networks infrastructure on biodiversity (both terrestrial and marine) in the short, medium and long term is minor negative but to a certain extent uncertain.

Table 7-3: Enhance biodiversity and ecological networks, deliver biodiversity net gain, protect and support ecosystem resilience and functionality Objective Summary

AoS Objective: Enhance biodiversity and ecological networks, deliver biodiversity net gain, protect and support ecosystem resilience and functionality	**Assessment of non-generic effects (by timescale)**		
Guide questions: • Protect and enhance nationally designated sites such as SSSIs and National Nature Reserves, Marine Conservation Zones, Marine Protection Areas and Highly Protected Marine Areas, including those of potential or candidate designation? • Protect and enhance valued habitat and populations of protected/scarce species on locally designated sites, including Key Wildlife Sites, Local Wildlife Sites and Local Nature Reserves? • Protect the structure and function/ecosystem processes, including in the marine environment? • Protect and enhance the Nature Recovery Network? • Protect and enhance priority habitats, and the habitat of priority species? • Promote new habitat creation or restoration and linkages with existing habitats? • Protect and enhance the wider green infrastructure network? • Increase the resilience of biodiversity to the potential effects of climate change? • Reduce or avoid impacts to habitats with important roles in carbon sequestration? • Encourage sensitive or nature inclusive design in terrestrial and marine environments? • Ensure energy activities protect fish stocks and marine mammals? • Ensure energy activities do not exacerbate disturbance to bird populations? • Deliver a minimum 10% net gain in biodiversity for any new major infrastructure development? • Increase the resilience of biodiversity to the potential effects of climate change?	S	M	L
	-	**-**	**-**

• Prevent spread of invasive species (native and non-native), including new invasive species because of climate change?			

AoS Objective 6: Protect and enhance the character and quality of the landscapes, townscapes and waterscapes and protect and enhance visual amenity

Anticipated effects

New overhead transmission lines can give rise to adverse landscape, townscape and visual impacts. These impacts depend on the type (for example, whether lines are supported by towers or monopole structures), scale, siting, and degree of screening of the lines, as well as the characteristics of the landscape and local environment through which they are routed. Underground transmission lines present less of an issue in this respect, apart from during construction.

In forested areas for example, the entire right-of-way width is cleared and maintained free of tall-growing trees for the life of the transmission line and as a result a permanent change to the land cover occurs. In agricultural areas, heavy construction vehicles temporarily suspend the use of the land for crop production. But after construction ends and the soils are properly restored, the land beneath the line can continue under agricultural use. For this reason, the area permanently affected by the line is usually much smaller than the area temporarily affected during construction. Where transmission lines are routed through areas that are valued for their scenic qualities, the visual impacts of the line tend to extend well beyond the local area.

The development of overhead transmission lines, which unlike overhead lines of 132kV and below, generally require to be supported on steel towers, add an industrial element and impact natural landscapes.

Sub-sea and foreshore cables due to their underwater nature are unlikely to impact landscapes and seascapes.

Cumulative adverse impacts may arise where new overhead lines are required along with other related developments such as substations, wind farms, and/or other new sources of generation.

Approach to development and mitigation as set out in updated EN-1 and updated EN-5

Updated EN-1 sets out comprehensive provisions for the protection of landscapes and seascapes. The existing planning regime for electricity networks infrastructure includes requirements under EIA regulations for assessment of visual impacts and use of the

Guidelines for the Routeing of new overhead lines (The Holford Rules) and the Guidelines for the design and siting of substations (The Horlock Rules) which tend towards mitigation of adverse visual impacts. Note also that NESO are currently developing Electricity Transmission Design Principles (ETDP), which will apply to onshore and offshore electricity transmission infrastructure. The ETDP are intended to provide greater clarity on the type of asset to be used in different environments, how the impact of transmission infrastructure on the environment, landscape, and communities can be mitigated, and set out flexibilities for route and technology design. It is the intention that once ETDP is published, developers should have regard to the ETDP in addition to the Holford and Horlock rules.

While it is the position of updated EN-5 that overhead lines should be the strong starting presumption for electricity networks development in general, in certain cases this presumption is reversed. Specifically, where a route crosses part of a nationally designated landscape (a National Park or National Landscape), and mitigation or re-routing to avoid harm to that landscape is not feasible, then the starting point will be that a developer should underground that section of the line. However, undergrounding will not be required where doing so is unfeasible in engineering terms, or where the harm caused by undergrounding is not outweighed by the visual impact/landscape benefits.

Additionally, cases will arise where – though no part of the proposed development crosses a designated landscape – a high potential for widespread adverse landscape and/or visual impacts along certain sections of its route may result in recommendations to use undergrounding for relevant segments of the line or alternatively consideration of using a route including subsea cabling.

In such cases, the Secretary of State should only grant development consent for underground or subsea sections of a proposed line over an overhead alternative if it is satisfied that the benefits accruing from the former proposal clearly outweigh any extra economic, social, or environmental impacts that it presents, and that any technical obstacles associated with it are surmountable.

In addition to good design in accordance with the Holford and Horlock rules and the ETDP when published, updated EN-5 notes the consideration of undergrounding or rerouting the line, the principal opportunities for mitigating adverse landscape and visual impacts of electricity networks infrastructure are:

- consideration of network reinforcement options (where alternatives exist) which may allow improvements and/or extensions to an existing line rather than the building of an entirely new line; and
- selection of the most suitable type and design of support structure in order to minimise the overall visual impact on the landscape. In particular, ensuring that towers are of the smallest possible footprint and internal volume.
- The rationalisation, reconfiguration, and/or undergrounding of existing electricity networks infrastructure in the vicinity of the proposed development.

Additionally, there are more specific measures that might be taken, and which the Secretary of State could mandate through DCO requirements if appropriate, as follows:

- Landscape schemes, comprising off-site tree and hedgerow planting, are sometimes used for larger new overhead line projects to mitigate potential landscape and visual impacts, softening the effect of a new above ground line whilst providing some screening from important visual receptors. These may be implemented with the agreement of the relevant landowner(s), or the developer may compulsorily acquire the land or land rights in question. Advice from the relevant statutory authority should be sought on design of such schemes, with particular consideration given to the selection of species mix which is appropriate to local landscape character.
- Screening, comprising localised planting in the immediate vicinity of residential properties and principal viewpoints can also help to screen or soften the effect of the line, reducing the visual impact from a particular receptor.

Although not specifically noted in EN-5, it is considered by the AoS that obtaining advice from the relevant statutory authority on the design of schemes, including selection of species mix, will help ensure that appropriate tree planting in the right location (e.g. avoiding peatlands), can be achieved.

Updated EN-5 notes where landscape schemes and/or screening mitigation of the kind described above is required, rights over the land necessary for such measures may be compulsorily acquired as part of the development's consent order. In addition, updated EN-5 recognises that since long-term management of the selected mitigation schemes is essential to their mitigating function, a management plan, developed at least in outline at the conclusion of the examination and which sets out proposals within a realistic timescale, should secure the integrity and benefit of these schemes and uphold the landscape commitments made to achieve consent, alongside any pertinent commitments to environmental and biodiversity net gain.

Assessment made in respect of updated EN-5

Through facilitating the expansion of the electricity transmission network, updated EN-5 is likely to have significant negative non-generic effects for landscape and townscape. This is despite some undergrounding or sub-sea cabling potentially taking place on a case by case basis due to potential widespread landscape impacts, and/or overhead line routes otherwise avoiding nationally designated landscapes such as National Parks and National Landscapes (formerly AONBs), design selection and the implementation of screening and landscape schemes.

For overhead lines, these effects will likely occur during construction (short-term) and with ongoing effects during operation (medium-term). These effects could be reversed in the long term if the infrastructure is decommissioned, though updated EN-5 recognises that it is generally understood that nationally significant electricity networks are not likely to be decommissioned, but to instead have an ongoing function so effects will be permanent into the long term.

For underground lines, minor negative effects on landscape are likely during construction only.

Therefore, the overall non-generic effect of transmission lines is likely to be major negative in the short, medium and longer term, despite the inclusion of mitigations, in both updated EN-1 and updated EN-5, which will help to minimise negative effects but are unlikely to reduce their significance, in particular for overhead transmission lines.

Table 7-4: Protect and enhance the character and quality of the landscapes, townscapes and waterscapes and protect and enhance visual amenity Objective Summary

AoS Objective: Protect and enhance the character and quality of the landscapes, townscapes and waterscapes and protect and enhance visual amenity	**Assessment of non-generic effects (by timescale)**		
Guide questions: • Avoid the development in National Parks and National Landscapes (formerly AONBs)? • Support the integrity of any areas designated for landscape value, including in conjunction with the provisions of any relevant Management Plan (e.g. National Parks, National Landscapes, Heritage Coasts and local landscape designations)? • Conserve and enhance the intrinsic character or setting of local landscapes or townscapes or waterscapes? • Minimise noise and light pollution from construction and operational activities on residential amenity and on sensitive locations, receptors and views? • Prevent reduced tranquility / preserve tranquility? • Conserve, protect and enhance natural environmental assets (e.g. parks and green spaces, common land, woodland / forests etc) where they contribute to landscape and townscape quality?	S **--**	M **--**	L **--**

AoS Objective 11: Improve health and well-being and safety for all citizens and reduce inequalities in health

Anticipated effects

Electric and Magnetic Fields (EMFs) are produced by overhead electricity lines (and to a lesser extent by underground electricity lines due to their buried nature) and these may have direct and indirect effects on human health. Small, charged particles, known as corona ions, originating from power lines have direct effects in terms of stimulus to the central nervous system resulting in its normal functioning being affected. Indirect effects occur through electric charges building up on the surface of the body producing a microshock on contact with a grounded object, or vice versa.

There is also a history of concern around the negative health effects of human exposure to EMFs, which can potentially lead to depressive and neurotic symptoms for some members of the population15.

The potential health effects of the electromagnetic fields generated by high voltage cables has been a highly controversial issue for more than 25 years. The results of some studies of human populations have suggested that there may be an increase in risk of childhood leukaemia at higher than usual magnetic field exposures in homes, some of which are near to large power lines. It is estimated that 2 to 5 cases from the total of around 500 cases of childhood leukaemia per year in the UK could be attributable to magnetic fields. This number is based on the assumption that exposure has to be above a certain threshold before there could be a health effect. The overall evidence, however, is not strong enough to draw a firm conclusion that magnetic fields cause childhood leukaemia. The evidence that exposure to magnetic fields causes any other type of illness in children or adults (such as cancer and Alzheimer's disease) is far weaker16. However, a study by doctors at the University of Bristol Medical School, has found that living near high voltage electrical pylons substantially increases the risks of contracting cancer17.

There is also potential for noise effects from high voltage transmission lines. The audible noise emitted is caused by the discharge of energy that occurs when the electrical field strength on the conductor surface is greater than the 'breakdown strength' (the field intensity necessary to start a flow of electric current) of the air surrounding the conductor. The highest noise levels generated by a line generally occur during rain. Water droplets may collect on the surface of the conductor and initiate corona discharges with noise levels being dependent on the level of rainfall. Audible noise effects can also arise from substation equipment such as transformers, quadrature boosters and mechanically switched capacitors18.

[15] https://pubmed.ncbi.nlm.nih.gov/9501332/
[16] https://www.gov.uk/government/publications/electric-and-magnetic-fields-health-effects-of-exposure/electric-and-magnetic-fields-assessment-of-health-risks
[17] https://cordis.europa.eu/article/id/15541-research-breakthrough-on-health-effects-of-pylons
[18] https://www.scientificamerican.com/article/what-causes-the-noise-emi/

Approach to development and mitigation as set out in updated EN-1 and updated EN-5

Updated EN-1 does not address the effects of EMFs on human health from electricity lines specifically. To prevent the known effects of EMFs, the International Commission on Non-Ionizing Radiation Protection (ICNIRP) developed health protection guidelines in 1998 for both public and occupational exposure. Government policy is that exposure of the public should comply with the ICNIRP (1998) guidelines. The electricity industry has agreed to follow this policy. Updated EN-5 states that applications should show evidence of this compliance.

In addition, updated EN-5 sets out that before granting consent to an overhead line application, the Secretary of State should be satisfied that the proposal is in accordance with the guidelines, considering the evidence provided by the applicant and any other relevant evidence. It may also need to take expert advice from the Department of Health and Social Care.

Updated EN-5 advises industry to follow the voluntary Code of Practice, 'Optimum Phasing of high voltage double-circuit Power Lines – A Voluntary Code of Practice', published in March 2012 and developed by government and industry, that defines the circumstances where industry can and will optimally phase lines with a voltage of 132kV and above.

Updated EN-5 notes that where the applicant cannot demonstrate that the line will be compliant with the Electricity Safety, Quality and Continuity Regulations 2002, with the exposure guidelines as specified in the Code of Practice on compliance, and with the policy on phasing as specified in the Code of Practice on optimal phasing then the Secretary of State should not grant consent.

Updated EN-5 acknowledges that undergrounding of a line would reduce the level of EMFs experienced, but high magnetic field levels may still occur immediately above the cable. It is not the government's policy that power lines should be undergrounded solely for the purpose of reducing exposure to EMFs. To avoid unacceptable adverse impacts of EMFs from electricity network infrastructure on aviation, the Secretary of State will take account of statutory technical safeguarding zones defined in accordance with Planning Circular 01/03, or any successor, when considering recommendations for DCO applications.

Updated EN-5 notes that where it can be shown that the line will comply with current public exposure guidelines (in terms of EMF) and the policy on phasing, no further mitigation should be necessary.

With regard noise, update EN-5 notes that the assessment of noise from substations, standard methods of assessment and interpretation using the principles of the relevant British Standards are satisfactory. Updated EN-1 already provides comprehensive generic planning conditions to address noise and vibration from NSIPs.

For the assessment of noise from overhead lines specifically, updated EN-5 sets out that the applicant must use an appropriate method to determine the sound level produced by the line in both dry and wet weather conditions, in addition to assessing the impact on noise-sensitive

receptors. For instance, the applicant may use an appropriate noise modelling tool or tools for the prediction of overhead line noise and its propagation over distance. When assessing the impact of noise generated by overhead lines in wet weather relative to existing background sound levels, the applicant should consider the effect of varying background sound levels due to rainfall. The Secretary of State is likely to regard it as acceptable for the applicant to use a methodology that demonstrably addresses these criteria.

Typical mitigation measures are noted as being:

- the positioning of lines to help mitigate noise;
- ensuring that the appropriately sized conductor arrangement is used to minimise potential noise;
- quality assurance through manufacturing and transportation to avoid damage to overhead line conductors which can increase potential noise effects;
- ensuring that conductors are kept clean and free of surface contaminants during stringing/installation; and
- the selection of quieter cost-effective plants.

In addition, the ES should include information on planned maintenance arrangements. Where detail is not included, the Secretary of State should consider stipulating appropriate maintenance arrangements by way of requirements attached to any grant of development consent.

Assessment made in respect of updated EN-5

The effect of EMFs on health is considered to be negative in the short, medium and long term (unless decommissioned, though it is to be noted that decommissioning is considered unlikely for overhead powerlines). Mitigations are provided in updated EN-5, including requiring the application of voluntary international guidelines on non-ionizing radiation (ICNIRP) and UK relevant regulations and code of practices. However, given that evidence regarding the seriousness of health effects associated with EMFs is somewhat contradictory, and that undergrounding is unlikely to occur for the sole reason of reducing EMFs, residual non-generic minor negative health effects as a result of exposure to EMFs cannot be ruled out by this assessment.

Noise from overhead lines is unlikely to lead to the Secretary of State refusing an application, but it may need to consider the use of appropriate requirements in the DCO to ensure noise is minimised as far as is practicable as set out in updated EN-1. As such, noise from overhead lines is considered to have a neutral non-generic effect on the health and well-being of citizens.

Table 7-5: Improve health and well-being and safety for all citizens and reduce inequalities in health Summary Objective

AoS Objective: Improve health and well-being and safety for all citizens and reduce inequalities in health	Assessment of non-generic effects (by timescale)

Guide questions:	S	M	L
• Protect the health of communities through prevention of accidental pollutant discharges, exposure to electric and magnetic fields, shadow flicker or radiation? • Minimise nuisance on communities and their facilities including, noise, artificial light, odour, dust, steam, smoke and infestation of insects? • Result in loss of recreational and amenity land or loss of access? • Provide for facilities that can promote more social interaction and a more active lifestyle and enjoyment of the countryside and coasts? • Promote initiatives that enhance safety and personal security for all?	--	--	--

Cumulative effects – Updated EN-5

Cumulative effects have been considered during the updated AoS-5 appraisal and noted where relevant under each topic. The following summarises the cumulative effects identified for updated EN-5:

- Climate change (Net Zero) effects: Through helping to facilitate the delivery of low carbon energy, updated -5 will contribute to the UK meeting its renewables targets and minimising greenhouse gas emissions. This is a cumulative effect already considered in AoS-1.
- Economic effects: Updated EN-5 is likely to contribute cumulatively to the overall positive effect of the Energy NPS documents for the UK Economy through ensuring a secure supply of energy required by industry and business and in supporting the transition to a low carbon economy. This is a cumulative effect already considered in AoS-1.
- Landscape, townscape and visual effects: Negative cumulative landscape and townscape effects can occur where new overhead lines are required alongside energy infrastructure, such as generating stations and related developments, such as substations. These are specific cumulative effects arising from updated EN-5.
- Equality effects: Updated EN-5 will contribute cumulatively to energy security and affordability, with positive effects for all socio-economic groups, especially low- income groups susceptible to fuel poverty. This is a cumulative effect already considered in updated AoS-1.

Summary of key findings of Appraisal of updated EN-5

Generally, electricity networks infrastructure development has similar generic effects to other types of energy infrastructure, although due to the linear nature of electricity lines, effects are often more dispersed and spread across a wider area. For the majority of the AoS objectives, the non-generic effects of updated EN-5 are considered to match those generic effects identified in respect of updated EN-1.

Updated EN-1 includes extensive mitigations to ensure these effects are considered by applicants and the Planning Inspectorate when preparing and determining applications. Updated EN-5 contains a range of technology specific mitigation measures, along with those proposed in updated EN-1, which seek to address the range of non-generic negative effects identified.

Nevertheless, it is considered that residual non-generic negative, but uncertain, effects will remain in most cases for the four AoS objectives considered (Carbon Emissions, Biodiversity, Landscapes, Townscapes and Seascapes and Health and Well-being).

The non-generic effects have been found to be generally negative across short, medium and long terms for all four AoS objectives.

In relation to the national target of reducing carbon emissions to Net Zero by 2050, technology specific effects have been found minor negative across the short, medium and long term, due to the potentially unavoidable use of SF6 in switchgear in certain circumstances.

Minor non-generic negative effects of technology on biodiversity in the short, medium and long term, due to the possibility of overhead lines continuing to affect birds in certain circumstances, despite mitigations proposed.

Significant and ongoing negative technology effects across the short, medium and long term are expected in terms of landscape and townscape / visual amenity due to overhead lines permanently affecting character and setting of landscapes and townscapes.

Regarding health and well-being, minor negative technology specific effects expected to arise across short, medium to long term, due to potential EMF exposure by people living near power lines.

Uncertainty is associated with this assessment, as at this level of appraisal, actual effects are dependent on the sensitivity of the environment and the location and design of infrastructure.

Updated EN-1 (informed by updated AoS-1) includes extensive mitigations to ensure these effects are considered by applicants and the Planning Inspectorate when preparing and determining applications. Updated EN-5 (informed by updated AoS-5) contains a range of technology specific mitigation measures, along with those proposed in updated EN-1, which seek to address the range of negative effects identified. Nevertheless, it is considered that residual negative, but uncertain, effects will remain in most cases for the four AoS objectives considered.

A summary of the likely non-generic effects arising specifically from electricity networks infrastructure is set out in the following Table 7-6.

Table 7-6: Summary of key findings specific to updated EN-5

AoS Objective	Assessment of non-generic effects (by timescale)		
	S	M	L
1. Consistent with the national target of reducing carbon emissions to Net Zero by 2050	-	-	-
2. Enhance biodiversity and ecological networks, deliver biodiversity net gain, protect and support ecosystem resilience and functionality	-	-	-
6. Protect and enhance the character and quality of the landscapes, townscapes and waterscapes and protect and enhance visual amenity	--	--	--
11. Improve health and well-being and safety for all citizens and reduce inequalities in health	-	-	-

Appraisal of alternatives – Updated EN-5

Introduction

The scope and methods of appraisal of alternatives are detailed in updated AoS-1. The strategic alternative identified for Electricity Network infrastructure in Section 1 was assessed using Sustainable Development themes that better keep the appraisal at the higher and strategic level (see table 5-14). The results are set out below.

Note that in consideration of Alternatives, the assessment is undertaken in comparison to updated EN-5 and not to each other alternative. As such, the findings of the AoS in respect of updated EN-5 broadly apply to the alternative identified – the key differentiator being the inclusion or absence of particular aspects related to the Technology and the relative outcomes of such inclusion or absence. To draw comparison between the alternative and updated EN-5 on a broad level, the following scale has been used.

Table 7-7: Differentiator Scale for Alternatives

Scale	Description
Large Positive	A materially different positive outcome is anticipated compared to updated EN-5
Positive	A more positive outcome is anticipated compared to updated EN-5

Neutral	This alternative is anticipated to have the same outcome as updated EN-5
Negative	A more adverse outcome is anticipated compared to updated EN-5
Large Negative	A materially different adverse outcome is anticipated compared to updated EN-5

Appraisal Results

The findings of the appraisal of the strategic alternatives for updated EN-5 are set out below, arranged by Sustainable Development (SD) theme.

The alternative under consideration is:

- EN-5 (a): adopt a blanket presumption that all electricity lines should be put underground.

Climate Change (Net Zero)

The provision of an improved/ upgraded electricity network infrastructure would facilitate the distribution of energy, including from low carbon energy sources. There are potential long term, positive impacts from improving clean energy distribution to help meeting net zero targets. These positive effects are shared by the preferred option as set out in updated EN-5. However, alternative EN-5 (a) adopting a presumption that all electricity lines should be put underground, would likely result in additional carbon emissions associated with energy intensive excavation and/or tunnelling technologies, with negative long term effects as compared to a preferred approach of selective undergrounding on a case by case basis. As for overhead power transmission, there will also be embodied energy (and carbon) in the material used for construction underground but this is not appraised as being significantly different from overground construction.

Headline SD themes	**Updated EN-5**	**Alternative (a)**
Climate Change (Net Zero)		Negative

Security of Energy Supply

Alternative EN-5 (a), adopting a presumption that all electricity lines should be put underground, will facilitate the transmission of energy, including from low carbon sources, and contribute overall to the delivery of secure, clean, affordable energy, with positive long term effects in the security of energy supply, in line with updated EN-5. Construction will require the use of raw materials for cabling, tunnelling and supporting infrastructure. Undergrounding will lead to significantly higher material costs given the additional structural requirements when compared with overhead power transmission. Where repairs are required to be undertaken on the underground lines, these can be costly and disruptive, and this can affect the security of

supply through lines being out of service for longer periods. These higher financial costs are potentially negative effects against security of supply objectives.

A presumption in favour of undergrounding for all electricity lines is also likely to result in higher generation of waste products from excavation (soil, rocks etc) which will have accompanying transport and disposal demands. Minor negative effects are possible over all timescales dependent on the location and scope of the transmission requirements.

Headline SD themes	Updated EN-5	Alternative (a)
Security of Energy Supply		Negative

Health and Well-Being

Alternative EN-5 (a), adopting a presumption that all electricity lines should be put underground, will lead to minor negative effects for noise objectives throughout the construction phase for electricity line undergrounding. The period of disruption would typically be longer than for equivalent overhead construction given the greater infrastructure demands. However, noise effects during operation and in the long term are appraised as project level/ local issues. Minor negative effects on air quality are also possible during the construction periods but are appraised as neutral in the medium to long term.

Potential electromagnetic field (EMF) effects arising from overhead lines require appropriate planning and mitigation. For underground lines, EMFs are typically more concentrated close to transmission lines but fall away rapidly at a distance from source. Updated EN-5 requires that the Secretary of State seek evidence of compliance with the International Commission on Non-Ionizing Radiation Protection's guidelines for electric, magnetic and electromagnetic fields. Taking account of the required mitigation, the effects of the underground alternative are appraised as neutral in the short, medium and long term.

The alternative will facilitate the transmission of energy, contributing positively to the overall security and affordability of supply for all population groups. However, the increased cost of undergrounding is likely to have negative impacts for affordability of electricity supply, especially on the part of the fuel poor. There is potential for the negative impacts of the development/construction phases to be more significant for populations in rural/remote areas, which are forecast to receive additional/new infrastructure to meet the demands of emergent (for example, offshore) technology types. The impacts for equality issues in the context of wider health and safety objectives are therefore appraised as uncertain, due to the negative effects on affordability.

Headline SD themes	Updated EN-5	Alternative (a)
Health & Well-Being		Positive / Negative

Economy

Alternative EN-5 (a), adopting a presumption that all electricity lines should be put underground, may contribute negatively to economic objectives during the construction and development phases, in comparison with the preferred approach (updated EN-5).

Although underground electricity lines are unlikely to affect negatively property prices (as opposed to overground lines where values of the property within 100m can be reduced by 6-17%, undergrounding will likely result in higher land take demands and construction footprint (when compared to updated EN-5) with substantially higher financial costs of which may negatively affect deliverability and economic viability of the electricity lines.

Headline SD themes	**Updated EN-5**	**Alternative (a)**
The Economy		Negative

The Built Environment

Alternative EN-5 (a), adopting a presumption that all electricity lines should be put underground, may in the short-term, have significant negative effects for electricity networks through disruption given the higher land footprint requirement than overhead power. This may be more significant in rural areas where networks are less extensive, although these effects are appraised as localised and short term. Mitigation at a local level in line with requirements set out in updated EN-5 would be necessary for this alternative.

The effect of the excavation for underground lines on soil and surface characteristics is considered under the Natural Environment. A potential consequence of the excavation is that it could alter surface and ground water flows leading to increased risk of both localised and wider regional flood events. The impacts of excavation on surface and groundwater flows may be mitigated by suitable design and construction. Any residual impacts on flood risk could be mitigated through Flood Risk Assessment (FRA) and would be necessary for developments in sensitive locations. Where mitigation is effectively incorporated, long term effects are likely to be neutral.

A presumption in favour of undergrounding may provide some resilience to the predicted effects of climate change (overhead power lines are more at risk from extreme weather events), however, undergrounding may also exacerbate localised vulnerabilities to the effects of climate change, for example by altering soil properties and drainage characteristics in flood prone areas. Mitigation measures would be necessary to ensure that undergrounding power lines does not contribute to greater flood risk in the long term.

The effects of undergrounding on archaeology are potentially significant and will depend on the sensitivities of the receiving location. Excavation requirements, and the associated financial costs, are substantially higher than for overhead lines and any negative effects are likely to be long term given the permanence of the structures.

Mitigation measures set out updated EN-5, including survey, Environmental Statement and avoidance of designated areas, should address negative impacts. In the long term, however, overall effects are location dependent and therefore uncertain.

Overall, this alternative supports the distribution of energy, including from low carbon sources with potentially positive effects for climate change objectives in the long term. There is uncertainty given that the overall mix of energy types is not known.

Headline SD themes	**Updated EN-5**	**Alternative (a)**
The Built Environment		Positive

The Natural Environment

Alternative EN-5 (a), adopting a presumption that all electricity lines should be put underground, has potentially significant negative impacts and effects for ecology in the short, medium and long term, due to direct habitat loss, disturbance and fragmentation. Undergrounding requires a substantially larger footprint than overhead power lines and its effects, for example on the soil and water environment, may have additional indirect negative effects on habitats and species integrity and survival. The disturbance and removal of soil (including when maintenance work is required) will require specific mitigation to prevent overall loss of quality in the long term. The negative effects for ecology are likely for the terrestrial and possibly fluvial environments. In the long term, the effects on mobile species (for example birds) from undergrounding may be less than those that occur from overhead lines, which can act as obstructions/barriers to migration routes.

The effect of excavation on soil and surface characteristics may also produce effects on surface and ground water flow leading to negative impacts on water quality and resources. Where mitigation is effectively incorporated, long term effects are likely to be neutral. The potential for changes in surface and ground water flow to affect flood risk is considered under the Built Environment theme.

Significant negative effects on both landscape and townscape are possible in the short term during the construction phases for undergrounding. The larger footprint required by undergrounding may enhance these short term negative effects.

A presumption in favour of undergrounding for all electricity lines will have significant positive effects for landscape receptors in the medium to long term by removing long term visual impacts associated with overhead lines. However, the short-term effects from undergrounding on the landscape may be more significant due to the larger construction footprint and disruption of soil.

The effects on the natural environment of undergrounding, or of undergrounding in particular locations (for example National Landscapes), are therefore considered to be significant and positive for landscape in the medium to longer term, but more likely to lead to negative impacts on ecology, soil and the water environment.

Headline SD themes	Updated EN-5	Alternative (a)
The Natural Environment		Positive / Negative

Summary of Alternative Findings and Approach for the Preferred NPS

The findings of the assessment of alternatives are summarised on Table 7-8. This shows how Alternative (a) was assessed as affecting the headline SD topics compared to updated EN-5. The detailed assessment of updated EN-5, appraising the absolute effects of the Policy Son the AoS objectives, is presented above in Section 7 of this report.

Table 7-8: Summary of Alternative Assessment for EN-5

Headline SD themes	Updated EN-5	Alternative (a)
Climate Change (Net Zero)		Negative
Security of Energy Supply		Negative
Health & Well-Being		Positive / Negative
The Economy		Negative
The Built Environment		Negative
The Natural Environment		Positive / Negative

Alternative EN-5 (a), adopting a presumption that all electricity lines should be put underground, would likely have minor negative effects compared to the updated EN-5 policy in relation to the AoS objective for climate change (Net Zero) due to the additional emissions associated with energy intensive tunnelling technologies.

Undergrounding electricity network infrastructure has significantly higher costs than the installation of overhead power lines and this aspect is appraised as having negative effects, which may be cumulative, for security of supply and economic objectives. The increased disruption caused by maintenance and repair of underground lines can also have effects on security of supply. On affordability and longer term security of supply issues, the preferred option is, therefore, more likely to ensure that the plan is delivered in the timescales necessary to support the transmission of energy supplied.

Undergrounding also demands a substantially higher footprint than overhead lines, and effects on soil, water, and archaeology are all likely to be negative in the short term and will require appropriate mitigation. There is some uncertainty as to the long term effects which will depend on the specific location and the sensitivity of the receiving environment. Significant negative effects in the short term are also appraised for biodiversity objectives, as direct loss and disturbance from extensive linear excavations are likely and will require extensive mitigation measures as detailed in updated EN-1 and updated EN-5. In common with the appraisal

findings for other elements of the natural environment, the exact nature of the effects and their duration will depend on the specific location and the sensitivity of the receiving environment.

Negative effects of undergrounding all electricity lines on landscape are appraised as short term (construction phase). In the long term, landscape, townscape and visual impacts will be positive given the removal of electricity lines from the line of sight of local and wider population receptors.

Given that underground lines are not without a range of adverse impacts of their own, and that they are significantly more expensive, it is considered better to adopt the policies set out in the updated EN-1 and updated EN-5 and not to prefer presumption in favour of undergrounding for all electricity lines. This is because the range of factors to be taken into account means that any decision to underground is best taken within a more flexible policy framework that follows a case by case evaluation of all of the impacts of a particular project and supports the use of both undergrounding and overhead lines as appropriate, in line with the appraisal findings.

7. Assessment of Critical National Priority for Low Carbon Infrastructure

Introduction

The NPS recognises that there is an urgent requirement for the United Kingdom to become more energy independent, with secure and resilient energy supply and that this will require a smooth transition to a much greater reliance on low carbon sources of energy to 2050 net zero ambitions. This requirement aligns with the Government's latest Clean Power 2030 Action Plan which accelerates the delivery of renewable and low carbon power in Great Britain to 2030 with at least 95% of the generation met by clean sources and a long term emphasis on electrification.

While clearly climate change is the paramount environmental challenge, with profound implications for all economic, environmental and social issues identified in this updated AoS, it is also to be recognised that a focus on low carbon and renewable energy generation in pursuit of Net Zero targets and security of supply can also have serious sustainability challenges and will require difficult decisions to be made during the planning process of any such new energy NSIP. As such, the NPS sets out that there is a need to ensure the UK can maintain high environmental standards and minimise impacts, while increasing the levels of deployment needed to meet energy security and net zero ambitions.

On this basis, Government has concluded that there is a critical national priority (CNP) for the provision of new nationally significant low carbon infrastructure, which is defined as a policy presumption that, subject to any legal requirements (including under section 104 of the Planning Act 2008), the urgent need for CNP Infrastructure to achieving energy objectives, together with the national security, economic, commercial, and net zero benefits, will in general outweigh any other residual impacts not capable of being addressed by application of the mitigation hierarchy.

Updated EN-1 identifies the following energy generating technologies as low carbon and therefore CNP infrastructure:

- for electricity generation, all onshore and offshore generation that does not involve fossil fuel combustion (that is, renewable generation, including anaerobic digestion plants, provided they meet existing definitions of low carbon; and nuclear energy generation for the production of electricity and heat, including for other end uses such as hydrogen for decarbonising heavy industry and transport, as well as natural gas fired generation which is carbon capture ready.
- for electricity grid infrastructure, all power lines in scope of EN-5 including network reinforcement and upgrade works, and associated infrastructure such as substations. This is not limited to those associated specifically with a particular technology, because

all new grid projects have a role in efficiently constructing, operating and connecting low carbon infrastructure to the National Electricity Transmission System.

- for other energy infrastructure, technologies, fuels, pipelines and storage infrastructure which fits within the normal definition of “low carbon”, such as hydrogen distribution, and carbon dioxide distribution.
- for energy infrastructure which is directed into the NSIP regime under section 35 of the Planning Act 2008, and fit within the normal definition of “low carbon”, such as interconnectors, Offshore Hybrid Assets, or ‘bootstraps’ to support the onshore network which are routed offshore.
- Lifetime extensions of nationally significant low carbon infrastructure, and repowering of projects, are also CNP infrastructure.

Assessment principles and processes outlined in the relevant NPSs will continue to apply to any CNP Infrastructure, with consideration made of all relevant impacts and benefits for all planning applications, on a case-by-case basis. Applicants for CNP infrastructure must therefore continue to show how their application meets the requirements set out in the updated EN-1 and the relevant technology specific NPS, applying the mitigation hierarchy, as well as any other legal and regulatory requirements. Note though that mitigation which results in a material reduction in generation capacity for CNP infrastructure should not be considered to be appropriate mitigation.

As such, it is anticipated that legal requirements such as those under Environmental Impact Assessment Regulations, or Habitats Regulations (or successor legislation), will continue to apply to all relevant energy infrastructure development and that every effort will be made to avoid, reduce and only after that compensate significant impacts of such NSIPs.

Developers must demonstrate in their application that the mitigation hierarchy has been applied. Developers should also demonstrate that the advice of the appropriate Statutory Nature Conservation Body (SNCB) has been sought, in order to determine that all residual impacts are genuinely those that cannot be avoided, reduced, or mitigated. Early engagement with SNCBs is encouraged, in order to help ensure that only applications which are fully prepared and comprehensive can be accepted for examination, enabling them to be properly assessed by the Examining Authority and leading to a clear recommendation report to the Secretary of State.

Therefore, it is anticipated that robust measures to ensure environmental protection will be provided for the vast majority of environmental issues. and it is only in exceptional circumstances, where residual impacts that are not capable of being addressed by application of the mitigation hierarchy, of any sort other than those that present an unacceptable risk to, or unacceptable interference with, human health, national defence or navigation, will the need for these protection measures be derogated ‘as a last resort’, when it can be satisfactorily demonstrated that the low carbon infrastructure could otherwise not be developed due to certain significant residual environmental impacts.

This ‘last resort’ approach will result not only in likely significant effects on the environment but also on likely significant effects for other sustainability aspects, not necessarily only of an environmental nature, which can be of positive or negative nature, or a combination of both. Effects may also differ between technologies. The following sets out a high level consideration of such anticipated effects under the ‘last resort’ approach as currently set out in updated EN-1.

Note that this consideration is necessarily high level as effects would only be fully understood in light of the precise location of the low carbon infrastructure and the specific technology to be developed. As such, as for Alternatives to the NPS, the assessment has been made against Sustainable Development themes that better keep the appraisal at the higher and strategic level. The themes considered are:

- Climate Change (Net Zero)
- Security of Energy Supply
- Health & Well-Being
- The Economy
- The Built Environment
- The Natural Environment

The assessment scale has been set out in Table 8-1:

Table 8-1: Differentiator Scale for Alternatives

Scale	Description
Large Positive	A materially different positive outcome is anticipated through application of CNP following application of requirements in updated EN-1 and in relevant technology NPS (if applicable).
Positive	A more positive outcome is anticipated through application of CNP following application of requirements in updated EN-1 and in relevant technology NPS (if applicable).
Neutral	Application of CNP to have similar outcomes to application of requirements in updated EN-1 and in relevant technology NPS (if applicable).
Negative	A more adverse outcome is anticipated through application of CNP following application of requirements in updated EN-1 and in relevant technology NPS (if applicable).
Large Negative	A materially different adverse outcome is anticipated through application of CNP following application of requirements in updated EN-1 and in relevant technology NPS (if applicable).

Appraisal Results

Climate Change (Net Zero)

As outlined in updated EN-1, there is an urgent need for different energy technologies to meet the decarbonisation target of net zero (100% reduction) by 2050 and the interim Government targets of reducing GHG emissions by 68% by 2030 and 78% by 2035 compared to 1990 levels. CNP is focused on ensuring the development of low carbon energy infrastructure can take place and as such, application of CNP is anticipated to result in a Large Positive outcome in respect of contributing significantly to emissions reduction and helping to meet the Net Zero target.

It is still the case that development of low carbon energy infrastructure will result in embedded carbon, often of significant quantities, but the requirements outlined in updated EN-1 such as the requirement for a whole life GHG assessment and GHG Reduction Strategy and which will still be required under the application of CNP, will ensure that this is minimised where possible and opportunities will be taken for carbon sequestration.

Headline SD themes	CNP	Assessment
Climate Change (Net Zero)		Large positive

Security of Energy Supply

Updated EN-1 emphasises the vital role of energy to economic prosperity and social well-being and notes that it is important that energy supplies remain secure, reliable and affordable. Historically the United Kingdom was able to rely on secure supplies of domestic coal production, later supplanted by oil and gas from offshore fields, but there has also been an increased reliance on imported fuels, at the same time as an urgent requirement to decarbonise energy supply in order to begin to address the drivers of climate change. External, macro level, factors such as COVID-19 and the war in Ukraine have also provided a large degree of uncertainty to energy production and as recognised by Government in ‘Powering Up Britain’, there is an urgent need to replace the decades long reliance on imported fossil fuels with low carbon energy, to make the UK more energy independent and protect the country from volatile international energy markets, while underpinning a clean energy transition, so the UK becomes a net zero economy by 2050. It is also the intention that this approach will also help make sure the UK has among the cheapest wholesale electricity prices in Europe by 2035.

CNP is focused on ensuring certainty that the development of low carbon energy infrastructure can take place and as such, application of CNP is anticipated to result in a Large Positive outcome in respect of energy security.

Headline SD themes	CNP	Assessment

Security of Energy Supply		Large Positive

Health and Wellbeing

Energy production and distribution has the potential to impact on the health and well-being of the population and this is well set out in updated EN-1. It is also recognised that many areas of energy infrastructure which are most likely to have a significantly detrimental impact on health are subject to separate regulation (for example for air pollution) which will constitute effective mitigation of them. The approach to CNP also makes clear that those proposed developments that present an unacceptable risk to, or unacceptable interference with, human health are unlikely to be approved i.e. the critical need for low carbon infrastructure will not outweigh risk to health.

Nevertheless, it should also be recognised that the approach to CNP could lead to indirect effects on health and wellbeing, which may not be immediately recognised. For example, development of energy infrastructure through the approach to CNP which leads to loss of open space, green infrastructure, recreational space, biodiversity, or perhaps the loss of crucial local services, can have implications for health and wellbeing and this should form part of the decision making process. On the other hand, low carbon infrastructure, can provide indirect health or wellbeing benefits such as through providing high quality employment opportunities (potentially in more remote or areas with declining industries) in a developing sector.

On the whole, it is clear that application of the approach to CNP does provide a robust approach to protecting health though effects, that while not considered likely to be significant given the measures outlined in the NPS, could be a mix of positive or negative and could only be determined in light of the precise location of any development and the proximity and nature of local receptors.

Headline SD themes	**CNP**	**Assessment**
Health & Well-Being		Positive / Negative

The Economy

As noted in updated EN-1, businesses and jobs rely on the use of energy, with economic output and associated jobs dependent on a robust and reliable system. A robust and reliable system also has important implications for consumers, as well as protecting the fuel poor, providing opportunities to save money on bills, giving warmer, more comfortable homes and balancing investment against bill impacts. In addition, it is anticipated that the construction, operation and decommissioning of low carbon energy infrastructure can be expected to have socio-economic effects at local and regional levels. Ensuring that low carbon energy infrastructure can be developed, through the application of the CNP approach, will have a large positive outcome in terms of the economy. This is in keeping with the priorities of government,

set out within ‘Powering Up Britain’, that the United Kingdom will seize the economic opportunities of the transition to net zero and help achieve economic security.

In short, ensuring the development of low carbon energy infrastructure will support the security, reliability and affordability of the national energy supply and lead to the provision of jobs and development of technical skills in local areas to the development and further afield. Confidence that the infrastructure will be developed will also have significant benefits across the wider economy, through for example allowing people and businesses to make long term investment decisions and could be expected to provide significant benefits through to the long term.

Headline SD themes	CNP	Assessment
The Economy		Large positive

The Built Environment

Application of the CNP approach could have Large Negative effects on the built environment, depending upon the specific location and nature of the infrastructure. For example, certain technologies could lead to clustering of development or there may be implications for increased flood risk, due to the location, nature or quantum of development. There could also be implications for the overall ‘urbanising’ effect caused by increased amounts and scale of infrastructure, or a reduction in overall tranquility or setting of heritage assets, though it is anticipated that these aspects would be fully explored prior to application of the CNP approach. For example, the CNP policy notes that decision making will take as a starting point that CNP Infrastructure will meet the justification requirements if it is to be located in Green Belt and all other aspects outlined in updated EN-1 such as built form, setting, links to transport etc. will be considered.

Nevertheless, overall effects are considered to be location dependent and therefore uncertain, but potentially Large Negative.

Headline SD themes	CNP	Assessment
The Built Environment		Large Negative

The Natural Environment

Updated EN-1 notes that the scope and scale of the development enabled by the NPS has the potential for a range of impacts on the natural environment and biodiversity including loss of habitat and species, disturbance, pollution, habitat fragmentation/severance/isolation, obstructions, changes to terrestrial microclimates and changes to coastal and marine processes due to construction, operation and decommissioning activities associated with energy infrastructure.

While updated EN-1 outlines measures that can help avoid or mitigate effects on the Natural Environment, or indeed help to promote elements such as protecting and enhancing the water environment, protecting soil resources, protecting air quality, delivering enhancements such as Biodiversity Net Gain and so on, application of the CNP approach has the potential for Large Negative effects on the Natural Environment. Of particular note are those issues which have already been identified through the AoS as being difficult to mitigate due to the nature of the technologies being developed and their scale, or the construction and operational activities required, such as effects on biodiversity, or effects on landscape.

For example, notwithstanding that the CNP approach takes as a starting point that CNP Infrastructure must demonstrate that where development that results in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) requires wholly exceptional reasons and a suitable compensation strategy, the application of CNP means that the development may still proceed (with NSIPs likely to come through the derogation process set out in the Habitats Regulations more readily). Inevitably, this could lead to direct or indirect damage, or loss, to irreplaceable habitats, designated sites and individual species, as well as to large negative effects on aspects such as the water environment, air quality, cultural heritage (including archaeological remains), soil resources and so on across the environmental spectrum.

As with the Built Environment, overall effects are considered to be location dependent and therefore uncertain, but potentially Large Negative.

Headline SD themes	**CNP**	**Assessment**
The Natural Environment		Large Negative

Summary of Assessment Results

As can be seen from the assessment, the application of CNP will have positive effects in respect of certain sustainability aspects. Most notably these positive effects are in relation to the need to address climate change, ensure security of energy supply and the needs of the economy.

Effects on health and wellbeing are considered to be potentially both positive and negative, but given the protection outlined in updated EN-1, the protection provided by other, separate and specific, legislation and the commitment that the CNP approach will not be applied if a development could result in an unacceptable risk to, or unacceptable interference with, human health, it is anticipated these positive or negative effects would not be significant.

However, effects on the Built and Natural Environment, through the application of CNP, have the potential to be Large Negative.

It is important to emphasise that the assessment has been necessarily high level as effects would only be fully understood in light of the precise location of the low carbon infrastructure and the specific technology to be developed. It is also important to emphasise that the

application of CNP is only in relation to those technologies deemed to be Low Carbon and is intended to be utilised only in circumstances where residual impacts are not capable of being addressed by application of the mitigation hierarchy, of any sort other than those that present an unacceptable risk to, or unacceptable interference with, human health, national defence or navigation. CNP will only apply where all legal requirements and the requirements of the NPS in relation to the mitigation hierarchy have been addressed as much as possible. As such the Secretary of State will take as the starting point for decision-making that such infrastructure is to be treated as if it has met any test requiring a clear outweighing of harm, exceptionality, or very special circumstances within updated EN-1, this NPS or any other planning policy.

However, Government's recent Clean Power 2030 Action Plan states clear objectives as far as avoiding significant environmental impacts for low carbon energy infrastructure. Such objectives include 'ensuring protection of nature is embedded into the delivery of Clean Power 2030' and 'new energy infrastructure should be built in a way that protects the natural environment by following a "mitigation hierarchy" to do what is possible to avoid damage to nature, and then minimising, restoring and delivering compensation when damage is impossible to avoid. The real opportunity available to the UK is to deliver clean power by 2030 in a nature positive way, such as rewetting lowland peat soils at the same time as constructing new solar farms or creating new wildlife corridors alongside or underneath linear energy infrastructure. This approach is not so much about "balancing" energy and the environmental needs; it's about integrating them. It's about rebuilding natural infrastructure at the same time as building the new energy infrastructure we need'. Given that most of the energy generating technologies identified as CNP are part of the low carbon energy infrastructure that Clean Power 2030 relies on, it is a recommendation of the AoS that Clean Power 2030 stated objectives need to be embedded in the assessment process of CNP infrastructure by the applicant and in the decisions made by the Secretary of State.

As the current CNP approach stops at compensation in the mitigation hierarchy, it will not rebuild nature at the same time as building the new energy infrastructure. It is recommended that CNP policy clearly states that enhancement will be required as part of any CNP compensation package.

Table 8-2: Summary of Alternative Assessment for CNP

Headline SD themes	CNP	Assessment
Climate Change (Net Zero)		Large Positive
Security of Energy Supply		Large Positive
Health & Well-Being		Positive / Negative
The Economy		Large Positive
The Built Environment		Large Negative
The Natural Environment		Large Negative

8. Cumulative and transboundary effects

Cumulative, synergistic and indirect effects of the Energy NPSs

It is a requirement to consider cumulative, synergistic and indirect effects of implementation of the energy NPSs. Secondary and indirect effects are effects that are not a direct result of the NPSs, but which occur away from the original effect or as the result of a complex pathway. Cumulative effects arise where several proposals or elements of the NPSs, individually may or may not have significant effect but in-combination have a significant effect due to spatial crowding or temporal overlap. Synergistic effects occur when two or more effects act together to create an effect greater than the simple sum of the effects when acting alone.

As required by the SEA Regulations, cumulative, synergistic and indirect effects have also been considered during the AoS of the updated EN-1, EN-3 and EN-5. It is considered that the updates do not change the considerations in the previous iteration of the AoS which are noted below, apart from the inclusion of Onshore Wind which brings additional cumulative effects.

Of particular note and a key element to the NPSs is the recognition of the need to reduce GHG emissions in order to help combat climate change. As such, there is a key focus within the NPSs for low or net zero carbon energy generation and transmission. In addition to reducing emissions at source, the NPSs provide for new technologies that will remove carbon emissions and store these (Carbon Capture and Storage). However, given the likely costs associated with the development of such infrastructure and the offshore location for the storage of the captured CO2, there is likely to be a clustering of installations around strategically located land based transfer stations prior to onward pumping of the CO2 to offshore head works.

Clustering of installations can have benefits, but also negatives and this is recognised within the NPSs. For example, it is noted in a number of areas that if development consent were to be granted for a number of projects within a region and these were developed in a similar timeframe, there could be short term negative effects. This could be on local economies through impacts of large scale construction activities leading to an influx of workers to an area driving up demand for housing and accommodation and local services. Similarly, this could lead to a shortage of skilled workers in the local area. On the other hand, beneficial cumulative effects could be accrued through increased spend in the local area, as well as increased opportunities for secure and well paid employment and development of skills / training, with potentially beneficial indirect effects on health. Such cumulative effects are more likely to be more pronounced in rural areas. It is considered that the NPSs provide a cumulative benefit to the population as a whole by helping to ensure certainty of investment and security of energy supplies that will help provide robust and low cost energy.

As well as cumulative effects on the local and wider population, there can also be effects experienced on environmental issues. Cumulatively this will again be most pronounced where infrastructure is clustered and it is to be noted that it does not all need to be of the same technology – combinations of technologies can act both cumulatively and synergistically

together, with effects on landscape being of particular note. Particular significance of these effects would depend on the location of the infrastructure and the sensitivity of the area, but it is to be noted that many of the areas where it could be expected that large scale energy infrastructure may be developed (due for example to the need for large amounts of cooling water), are also frequently the most prized landscapes or seascapes.

Technological drivers are a key consideration in respect of the potential for cumulative effects and the NPSs do place careful emphasis on the need to analyse all such aspects. For example, and as noted, many energy installations need availability of large amounts of water resources to meet process water demands and cooling water requirements, as well as suitable discharge locations. They may also require to be located close to ports to receive imported fuel stock and other raw materials and for outward transport of residues to export markets. Renewable technologies are not immune from such demands, which may also lead to clustering of such facilities.

Due to the potential for technological drivers leading to cumulative effects, each of the technology specific EN's were considered for the potential for cumulative effects. Across all technologies it was considered that cumulative effects of construction (e.g. air quality, dust, noise, visual, traffic, socio- economic etc.) may arise with the development of the specific technologies and it is to be recognised that these are not likely to be developed in isolation – for example, within EN-3 (Renewables) an onshore windfarm would also likely require access roads, cabling and connections to the transmission network. It is likely that all elements would be constructed within the same timeframe and connecting to each other, resulting in cumulative effects of a temporal and spatial nature, though such effects would likely be temporary.

It is also to be recognised that even technologies that could be anticipated to be dispersed and spread across a wider area such as the linear electricity networks noted in EN-5, can have potential for cumulative effects. Such effects can include those relating to landscape and townscape including potentially within areas noted for tourist-dependent economies. Effects could occur where new overhead lines are required alongside energy infrastructure, such as generating stations and related developments, such as substations.

These potential cumulative effects will be felt across a number of AoS objectives in an adverse manner including air quality, water quality, resource use, biodiversity and traffic and transport amongst others. These would for the most part arise during construction and they may be difficult to mitigate. As such, the NPS places careful emphasis for decision makers to balance such competing issues. It also places a strong emphasis on the need for further consideration of all issues and effects (including cumulative effects) through applicable assessment types such as EIA, or through socio-economic assessment.

The NPSs also ensure consideration needs to be made of cumulative effects across the full timescale of the energy infrastructure, through to decommissioning and beyond. It is to be recognised that this could be many decades in respect of some technologies.

In short therefore, while the lack of clarity relating to location of infrastructure means it is not possible to be precise as to cumulative, synergistic and indirect effects, it is possible to conclude that the significance and nature of cumulative effects may vary with the mix of technology projects proposed and the sensitivity of the receiving communities and environment. The NPSs though set out a series of approaches that will address and manage these issues.

It is important to recognise though, that the declaration of a project as being of Critical National Priority, could lead to a potential for cumulative, synergistic or indirect effects, in relation to those residual effects which it has not been possible to address through application of the NPS. This is particularly likely if a group of developments, all considered to be of CNP and with potentially the same residual effects, are located in proximity to each other, or where there are clear pathways of effect.

Cumulative effects in-combination with other plans and policies

Cumulative effects can also arise due to effects from the energy NPSs combining with effects from other plans and policies. However, due to the strategic and high level nature of the energy NPSs and the lack of any locational and specific detail on any infrastructure developments that are likely to be brought forward, as well as that inevitably there is going to be a delay between the adoption of the energy NPSs and any subsequent energy infrastructure development, it is not possible to know when (or indeed if) any subsequent project proposal will come forward and it is not therefore possible to predict what other plans and projects will be relevant to future project assessments. While this is the case in respect of this AoS, it is recognised that a more strategic approach is likely, through elements such as the Strategic Spatial Energy Plan and the Centralised Strategic Network Plan (in respect of transmission lines set out in EN-5) and consideration of cumulative effects will be made as part of those processes.

The type of PPPs that could have cumulative or in-combination effects with infrastructure developed under the NPSs are:

- Applications lodged but not yet determined;
- Projects subject to periodic review;
- Projects authorised but not yet started;
- Projects started but not yet completed;
- Known projects that do not require external authorisation;
- Proposals in adopted plans; and
- Proposals in draft plans formally published or submitted for final consultation, examination or adoption.

Typical types of effects that could lead to cumulative or in-combination effects include (but are not limited to):

- Weakened resilience to climate change
- Noise, vibration and light disturbance;
- Air, land and water pollution;
- Changes to water quantity / flow and coastal change,
- Changes to landscape;
- Increased species injury and mortality;
- Changes in habitat extent, composition and structure;
- Changes to factors that affect Health and Wellbeing;
- New transport requirements; and
- Changes to factors that affect the Economy

Such in-combination effects are more likely to arise when multiple projects have similar impacts; due to effects exceeding the limit of what the relevant sustainability parameters can tolerate and becoming significant effects. Note that projects that include non-energy infrastructure development and smaller scale development that is not an NSIP can also lead to cumulative or in-combination effects and should be considered at the appropriate point. In-combination effects can be by virtue of proximity, connectivity and/or timing. The most common combined effects include additive air quality, water quality/quantity and habitat/species disturbance impacts.

Application of the approach to CNP could also result in cumulative effects with other plans and policies, though again the scale and nature of such effects cannot be known at this stage.

Transboundary effects

Potential transboundary effects from the NPSs are approached in a similar way to other cumulative effects, only that the assessment looks at effects that originate within the UK but have the ability to extend across national borders. Transboundary effects are addressed through Regulation 14 of the SEA Regulations, which requires notification to Member States of the European Union of any Plan or Programme which is considered likely to have significant effect on the environment of that Member State.

The updates made in respect of EN-1, EN-3 and EN-5 are not considered to give rise to new transboundary effects. As such, the assessment of transboundary effects remains unchanged from the previous iteration of the NPS. The two types of technology which continue to considered in this assessment of transboundary effects remain nuclear and offshore wind.

Transboundary effects from nuclear power stations are addressed in the AoS of EN-6 and are expected to be addressed in the new EN-7. Unintended release of radiation from nuclear power stations may result in transboundary effects. In the UK, the nuclear regulatory bodies will need to be satisfied that the radiological and other risks to the public associated with accidental releases of radioactive substances are as low as reasonably practicable and within

the relevant radiological risk limit. As part of the site licensing process, a potential operator will be required to demonstrate that the nuclear facility is designed and can be operated such that several levels of protection and defence are provided against significant faults or failures, that accident management and emergency preparedness strategies are in place and that all reasonably practicable steps have been taken to minimise the radiological consequences of an accident. The robustness of the regulatory regime surrounding these installations in the UK thus results in a low probability of an unintended release and therefore any significant transboundary effects.

Radioactive releases from nuclear power stations are strictly controlled in accordance with limits laid down in permits issued by the Nuclear Installations Inspectorate and the Environment Agency under the Environmental Permitting (England and Wales) Regulations 2016. This regulatory system ensures that permitted radioactive discharges are within authorised limits. These releases are likely to remain sufficiently localised so as not to impact significantly on neighbouring countries.

Transboundary effects of offshore wind farms are identified in relation to fish, marine mammals and birds as their movements are independent of national geographical boundaries. The biodiversity assessment for this technology concluded that there are likely significant transboundary effects on these receptors. The HRA concludes that there is potential for adverse effects on habitat sites in other nations (transboundary), particularly as a result of offshore wind and coastal development.

Transboundary effects of offshore wind farms are also identified on human activities such as on navigation, wind energy, grid connection and other.

Therefore, it is considered that Ireland, France, Belgium, Germany, Denmark, Sweden and the Netherlands should be consulted on the potential for significant environmental effect from implementation of the NPS. For the same reasons, there would also be potential effects on Norway and the Crown Dependencies of the Isle of Man and the Channel Islands as well as in each of the four nations within the United Kingdom.

The transboundary effects (if any) of individual proposals for both new nuclear and offshore wind farms (including any associated infrastructure such as cables) will be considered at project-level as part of the development consent process. The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (‘the EIA Regulations’) set out the requirements governing statutory notification and consultation in respect of transboundary effects of projects on EEA States. Regulation 32 of the EIA Regulations establishes the procedural duties necessary where an NSIP is likely to have significant effects on the environment in an EEA State. The duties under Regulation 32 apply until the decision on the DCO is made. As such, identification of the relevant State will be made in light of the technology being developed and the location within which the development is to take place.

It is important to recognise that the approach set out in the NPS relating to Critical National Priority may have implications for the ultimate protection of the environment in certain circumstances, as outlined in Section 8. As such application of CNP may also have

implications in relation to transboundary effects, though it is not possible to be certain in this regard until precise location of development, type of technology and anticipated impacts are known. Nevertheless, it is anticipated that such issues derived from application of CNP relating to potential trans-boundary effects would be considered and discussed with relevant authorities through the mechanisms outlined above.

9. Monitoring

Monitoring helps to examine the effects predicted through the AoS process against the actual effects of the NPSs when they are implemented. It is also a requirement of the SEA Regulations to describe the measures envisaged concerning how significant effects of implementing the NPS will be monitored – Section 17 (1) notes "*the responsible authority shall monitor the significant environmental effects of the implementation of each plan or programme with the purpose of identifying unforeseen adverse effects at an early stage and being able to undertake appropriate remedial action*". As ODPM Guidance advises, it is not necessary to monitor everything, or monitor an effect indefinitely, but rather monitoring needs to be focused on significant sustainability effects. Monitoring should therefore focus upon significant effects that may give rise to irreversible damage, with a view to identifying trends before such damage is caused, and significant effects where there was uncertainty in the AoS and where monitoring would enable preventative or mitigation measures to be undertaken.

While significant effects have not been identified in relation to all Objectives and it is considered that in many instances the NPS provides robust policy to address issues, the non-specific spatial nature of the NPS does mean that there is in some instances a degree of uncertainty in findings and as such a potential for unforeseen individual or cumulative effects to arise. Therefore it was considered important to take a precautionary approach to monitoring.

It is also the case that it is the intention that the consideration for a review of the NPS will in future be taken on a regular 5 year basis. As such, a comprehensive monitoring programme will help inform future iterations of the NPS.

Table 10-1: Overall effects and monitoring requirements

AoS Objective	Overall effects of NPS and need for monitoring
Objective 1: Consistent with the national target of reducing carbon emissions to Net Zero by 2050	Generally, the NPS continues to perform significantly positively in respect of this Objective through the promotion of a variety of zero and low carbon technologies and will likely be transformational in enabling England and Wales to transition to a low carbon economy and thus help to realise UK Net Zero commitments sooner than continuation under the current planning system. However, some uncertainty continues about the exact level of transformation as it is difficult to predict the mix of technology that will be delivered by the market against the framework set by the Government and its cumulative contribution in terms of GHG emissions. There remains a requirement for certain technologies which have been identified as resulting in negative effects across the short, medium and long term, due to the potential use of unabated carbon technologies and of SF6 in switchgear, respectively. It is thus important that these particular effects are monitored.

Objective 2: Maximise adaptation and resilience of built assets, communities and people as well as natural assets, habitats and species, to the multiple effects of climate change *	The NPS continues to generally perform well in respect of adaptation and resilience to climate change through the requirements that are placed on developers to address this extremely important topic in the face of unavoidable climate change. There continues to be a degree of uncertainty over the severity of such climatic events, how technologies may adapt to such circumstances and in combination effects with other non-energy infrastructure projects may affect such adaptation. As such there is a high chance of unforeseen effects arising against this objective which will need to be carefully monitored.
Objective 3: Enhance biodiversity and ecological networks, deliver biodiversity net gain, protect and support ecosystem resilience and functionality	The technologies promoted by the NPS continue to potentially result in significant adverse effects on biodiversity, both onshore and offshore, particularly in the short term but also in the medium to long term. The effects could be direct, indirect, cumulative or synergistic. Longer term, there continue to be opportunities for positive effects through achievement of Biodiversity Net Gain or other environmental enhancement as part of the implementation of the energy projects. However, there continues to be a degree of uncertainty associated with the effects identified due to the non-spatial nature of the NPS and a potential for unforeseen effects, from issues such as clustering of technology and in combination effects with other non-energy projects which will need to be carefully monitored.
Objective 4: Protect and enhance sites designated for their international importance for nature conservation purposes	There continues to be potential for significant negative effects on sites designated for their international importance and nature conservation purposes (as a result of the implementation of energy projects promoted by the NPS or in combination with other non-energy projects) in the short, medium and long term. This could include effects on sites which are in the jurisdiction of other countries (transboundary). The effects identified continue to be uncertain as they will depend on the specific locations and scale of development, which is largely unknown at this stage given that the NPSs do not outline specific proposals. Such effects will require monitoring.
Objective 5: Protect and enhance cultural heritage assets and their settings, and the wider historic environment	For the most part, it is anticipated that there is the potential for continued minor negative effects (including cumulative effects) on heritage assets and their settings (designated and non-designated) on land and at sea in the short, medium and long term. It is considered that there are sufficient requirements planned by the NPS on developers to address the anticipated adverse effects associated with this Objective. However, it is considered that there is also a potential for continuation of unforeseen potentially significant effects to occur due to issues such as clustering of technologies which cannot be determined at

	this stage due to the non-specific / spatial elements of the NPS as well as in-combination effects with non-energy infrastructure projects. Such effects will require monitoring.
Objective 6: Protect and enhance the character and quality of the landscapes, townscapes and waterscapes and protect and enhance visual amenity	Significant negative effects for landscape, seascape and townscape and visual receptors continue to be likely as a result of the NPS implementation in the short, medium and long term and it is to be noted that due to the considerable size of energy infrastructure projects supported by the NPS, opportunities for mitigation of such effects will be limited. Increased numbers of onshore wind projects, particularly in upland areas, or those exposed low lying areas could lead to particular landscape challenges, with likely significant effects. It is also considered that there continues to be a potential for unforeseen significant effects to occur due to issues such as clustering of technologies due to the non-specific / spatial elements of the NPS as well as in combination effects with non-energy infrastructure projects. It is thus important that such effects are monitored.
Objective 7: Protect and enhance the water environment	Minor negative effects for water quality are likely to continue as a result of the NPS implementation in the short term through to the long term as it will not be possible to avoid all negative effects on the water environment, given the likely scale and nature of the technologies being supported by the NPS. The effects may occur, for example, through construction activities releasing pollutants into the water environment and cooling water abstraction and discharge for technologies such as power stations. While it is considered that the NPS provides a robust approach to dealing with these issues, there remains the potential for significant effects to continue to occur due to unforeseen issues associated with the non-specific / spatial elements of the NPS and the potential for clustering of certain types of energy infrastructure and in combination effects with other non-energy infrastructure projects. Such effects will require monitoring.
Objective 8: Protect and enhance air quality on a local, regional, national and international scale	While the NPS notes a robust approach to managing effects on air quality, it is anticipated that such effects will likely continue to be slightly adverse, due to the potential for emissions of air pollutants during construction of projects and residual operational emissions for some types of technologies. While it is considered that the NPS provides a robust approach to dealing with these issues, there remains the potential for significant effects to occur due to unforeseen issues associated with the non-specific / spatial elements of the NPS and the potential for clustering of certain types of energy infrastructure and in combination effects with other non-energy infrastructure projects. Such effects will require monitoring.

Objective 9: Protect soil resources, promote use of brownfield land and avoid land contamination	Minor negative effects on soil resources are likely to continue as a result of the NPS implementation in the short, medium and long term due to the potential for loss of agricultural land and contamination of soil, potentially from spills of oil or chemicals used in the construction, operations and decommissioning of certain types of energy infrastructure. Some development of infrastructure may continue to provide opportunities to address contamination, or redevelop brownfield sites. The effects identified continue to be uncertain (and as such potentially unforeseen) as they will depend on the specific nature, location and scale of development. It is thus important that such effects are monitored.
Objective 10: Protect, enhance and promote geodiversity	There is potential for continuation of negative effects on geodiversity due to NPS implementation in the short, medium and long term, through loss of land / seabed, changes to coastal processes etc., particularly during construction impacting geodiverse sites. However, due to the potential for enhancement of access to geological features, there is also potential for continuation of minor positive effects in the medium to long term. The effects identified are uncertain (and as such potentially unforeseen) as they will depend on the specific location, nature, design and scale of development.
Objective 11: Improve health and well-being and safety for all citizens and reduce inequalities in health	Reliable energy supplies nationally promoted by the NPS will continue to contribute to positive effects generally on the economy and skills with indirect positive effects for health and well-being in the medium to longer term through helping to secure affordable supplies of energy and minimising fuel poverty. Opportunities for employment and training (across the short, medium and long term) are also continue to be likely, with consequent indirect beneficial effects on wellbeing. The NPS continues to make clear the need to identify potential adverse health impacts, including on vulnerable groups within society and notes that opportunities should be taken to mitigate direct impacts by promoting local improvements to encourage health and wellbeing. The potential for in combination effects with other non-energy infrastructure projects will also need to be considered. The success of such an approach would be informed through effective monitoring.
Objective 12: Promote sustainable transport and minimise detrimental impacts on strategic transport network and disruption to basic	The NPS continues to provide for a robust approach to promoting sustainable transport, as well as minimising detrimental impacts on the strategic transport network and disruption to services and infrastructure. It also describes the need to promote sustainable transport modes (including water borne transport, as well as improving access by active, public and shared transport, walking

services and infrastructure	and cycling), as well as to reduce the need for parking. As such, it is anticipated that uncertain (and as such unforeseen) effects may continue to be experienced in the short (construction) term but with benefits experienced across the later timescale of the development. There remains, however, the potential for significant effects to continue to occur due to unforeseen issues associated with the non-specific / spatial elements of the NPS and the potential for clustering of certain types of energy infrastructure and in combination effects with other non-energy infrastructure projects. Such effects will require monitoring.
Objective 13: To promote a strong economy with opportunities for local communities	Development of new energy infrastructure as promoted by the NPS will continue to support the security, reliability and affordability of the national energy supply and continue to lead to the provision of jobs in local areas to the development and further afield. Some of these jobs are likely to be specialist in nature, but others will be lower skilled, or suitable for apprenticeships or will provide opportunities to further develop skills. It is anticipated that most jobs created would be during the construction phase, with significantly less fewer jobs during operation and then an increase during any decommissioning phase. As noted though, a significant increase in workers can lead to stress on local housing and labour markets (particularly in more rural areas / smaller towns) and it is considered monitoring would help to inform approaches to these issues. As such, some slight adverse effects continue to be anticipated in the short term, but overall, there should be significant benefits in local areas during construction, with ongoing benefits through the medium to long term. There remains, however, the potential for continuation of significant effects to occur due to unforeseen issues associated with the non-specific / spatial elements of the NPS and the potential for clustering of certain types of energy infrastructure and in combination effects with other non-energy infrastructure projects. Such effects will require monitoring.
Objective 14: Promote sustainable use of resources and natural assets	The NPS continues to provide a robust approach to promoting sustainable use of resources and natural assets. A strong emphasis is placed on promoting the 'Circular Economy' and note is made of how good design can reduce the requirement for consumption of materials. Applying this to a project at as early a stage as possible will act to reduce consumption. Clear note is also made of a number of key aspects such as the waste hierarchy, and the requirement to set out the arrangements that are proposed for managing any waste produced for waste management plans, as well as the sourcing of materials from recycled or reused sources and the use of low

	carbon materials. While there will be a high level of consumption of sources in the short term (construction phases), including virgin material, this will reduce during the operational phase and techniques such as the use of Building Information management tools (or similar) will provide opportunities in the long term for realising the recovery and reuse of materials used at the construction stage. Use of resources and waste arisings will need to be monitored as part of scheme development.

The sustainability effects of the energy NPSs may be monitored through the monitoring frameworks already carried out by the environmental regulators and the local authorities. Pollution control and environmental management monitoring, including status of water quality and resources, protected habitats and species, is carried out by the environmental agencies; human health protection is the responsibility of the health authorities and Department for Health and Social Care (including UK Health Security Agency and the Office for Health Improvement and Disparities); and the extent of nuclear generating activities will be monitored through the nuclear licensing procedures. Local Planning Authorities monitor the effectiveness of their spatial plans, including indicators such as employment and access to community facilities and services. Nationally, government assesses and reports annually on progress against sustainable development indicators (including greenhouse gas and carbon dioxide emissions), energy use (including renewables), and resources (including water).

Table 10-2: Proposed monitoring

AoS Objective	Monitoring measure / indicator	Target	Data Source	Suggested frequency	Responsibility
Objective 1: Consistent with the national target of reducing carbon emissions to Net Zero by 2050	CO2 and other GHG emissions such as SF6 from energy sector (by source)	Reduce to pathway consistent with Net Zero targets	DESNZ: UK greenhouse gas emissions national statistics	Annual	DESNZ
	% output from low carbon sources	To be consistent with Net Zero target	DESNZ: Digest of UK Energy Statistics (DUKES)	Annual	DESNZ
	Electricity generation by technology	To be consistent with Net Zero target	DESNZ: Digest of UK Energy Statistics (DUKES)	Annual	DESNZ
Objective 2: Maximise adaptation and resilience of built assets, communities and people as well as natural assets, habitats and species, to the multiple effects of climate change *	Area of flood risk (from all sources) constructed upon by new Energy Schemes	Zero	Environment Agency, Local Authorities and Energy Scheme developers (in respect of individual projects)	Annual	Energy Scheme developers (in respect of individual projects) – reporting to DESNZ
	Number of new Energy Schemes designed for	All	Environment Agency, Local	Annual	Energy Scheme developers (in

AoS Objective	Monitoring measure / indicator	Target	Data Source	Suggested frequency	Responsibility
	successful adaptation to climate change		Authorities and Energy Scheme developers (in respect of individual projects)		respect of individual projects) – reporting to DESNZ
	Number of new Energy Schemes designed to include best practice SuDS (where appropriate) and / or upstream Natural Flood Management	Increase	Environment Agency, Local Authorities and Energy Scheme developers (in respect of individual projects)	Annual	Energy Scheme developers (in respect of individual projects) – reporting to DESNZ
Objective 3: Enhance biodiversity and ecological networks, deliver biodiversity net gain, protect and support ecosystem resilience and functionality	Net Gain in Biodiversity (using the DEFRA metric) due to energy schemes	Increase in Biodiversity Net Gain	Natural England, Local Authorities and Energy Scheme developers (in respect of individual projects)	Annual	Energy Scheme developers (in respect of individual projects) – reporting to DESNZ
	Number of Energy Schemes with overall adverse impact on sites designated for nature conservation	Year on year decrease	Natural England, Joint Nature Conservation Committee, Local Authorities and	Annual	Natural England, Joint Nature Conservation Committee, Local Authorities and

AoS Objective	Monitoring measure / indicator	Target	Data Source	Suggested frequency	Responsibility
			Energy Scheme developers (in respect of individual projects)		Energy Scheme developers (in respect of individual projects)
	Changes in areas of biodiversity importance (priority habitats and species by type) and areas designated for their intrinsic environmental value including sites of national, regional or sub regional significance	Year on year increase in area (ha)	Natural England, Joint Nature Conservation Committee, Local Authorities and Energy Scheme developers (in respect of individual projects)	Annual	Natural England, Joint Nature Conservation Committee, Local Authorities and Energy Scheme developers (in respect of individual projects)
	Area of Green Infrastructure	Year on year increase in area (ha)	Natural England, Local Authorities and Energy Scheme developers (in respect of individual projects)	Annual	Natural England, Local Authorities and Energy Scheme developers (in respect of individual projects)
Objective 4: Protect and enhance sites designated for their international importance	Condition of international and or habitat sites	Year on year increase in improvement	Natural England, Joint Nature Conservation Committee, Local	Annual	Natural England, Joint Nature Conservation Committee, Local

AoS Objective	Monitoring measure / indicator	Target	Data Source	Suggested frequency	Responsibility
for nature conservation purposes			Authorities and Energy Scheme developers (in respect of individual projects)		Authorities and Energy Scheme developers (in respect of individual projects)
Objective 5: Protect and enhance cultural heritage assets and their settings, and the wider historic environment	Change to heritage assets and their settings compared to a baseline assessment Number of heritage assets that are placed on or removed from the Heritage at Risk register as a result of development	Reduction in direct impacts from energy infrastructure as it is developed (including those areas where infrastructure may be clustered).	Historic England, Local Authorities and Energy Scheme developers (in respect of individual projects)	Annual	DESNZ
Objective 6: Protect and enhance the character and quality of the landscapes, townscapes and waterscapes and protect and enhance visual amenity	Change in the quality of character or status of a designated area	Reduction in direct impacts from energy infrastructure as it is developed (including those areas where infrastructure may be clustered)..	Natural England, National Parks and National Landscape Management Groups, Environment Agency	Annual	DESNZ

AoS Objective	Monitoring measure / indicator	Target	Data Source	Suggested frequency	Responsibility
	Changes in settings and views	Reduction in direct impacts from energy infrastructure as it is developed (including those areas where infrastructure may be clustered).	Natural England, National Parks and National Landscape Management Groups, Environment Agency and Energy Scheme developers (in respect of individual projects)	Annual	DESNZ
Objective 7: Protect and enhance the water environment	Number of water pollution incidents attributable to the Energy Sector (across all waterbodies)	Zero	Environment Agency, Local Authorities and Energy Scheme developers (in respect of individual projects)	Annual	Energy Scheme developers and Operators (in respect of individual projects / facilities) – reporting to DESNZ
Objective 8: Protect and enhance air quality on a local, regional, national and international scale	No exceedances of Air Quality Objectives or limit values	Zero	DEFRA / Environment Agency, Local Authorities and Energy Scheme	Annual	Energy Scheme developers and Operators (in respect of individual projects

AoS Objective	Monitoring measure / indicator	Target	Data Source	Suggested frequency	Responsibility
			developers and Operators (in respect of individual projects)		/ facilities) – reporting to DESNZ
	Meet air quality emission targets	Reduce emissions consistent with aim to meet targets to Ceiling Directive	DESNZ and Energy Scheme developers and Operators (in respect of individual projects).	Annual	Energy Scheme developers and Operators (in respect of individual projects / facilities) – reporting to DESNZ
Objective 9: Protect soil resources, promote use of brownfield land and avoid land contamination	Area (in hectares) of best and most versatile land (grades 1,2 or 3a) included within or impacted by new Energy Schemes	Year-on-year reduction in the area of best and most versatile land within or impacted by new Energy schemes subject to loss or degraded quality.	Local Authorities and Energy Scheme developers (in respect of individual projects)	Annual	Energy Scheme developers and Operators (in respect of individual projects / facilities) – reporting to DESNZ
	Area (in hectares) of previously contaminated land included within or	100% of previously contaminated land covered by new Energy	Local Authorities and Energy Scheme developers (in respect of	Annual	Energy Scheme developers and Operators (in respect of individual projects

AoS Objective	Monitoring measure / indicator	Target	Data Source	Suggested frequency	Responsibility
	impacted by new Energy Schemes	Schemes subject to decontamination measures	individual projects)		/ facilities) – reporting to DESNZ
	Area (in hectares) of brownfield land included within or impacted by new Energy Schemes	Increase in amount of brownfield land utilised by new Energy schemes	Local Authorities and Energy Scheme developers (in respect of individual projects)	Annual	Energy Scheme developers and Operators (in respect of individual projects / facilities) – reporting to DESNZ
Objective 10: Protect, enhance and promote geodiversity	Area (in hectares) of designated geodiversity sites (RIGS and / or SSSIs) included within or impacted by Energy schemes	100% of designated geodiversity sites retained at their current condition or subject to improvement in their condition Year-on-year reduction in the % of geodiversity sites within or impacted by Energy schemes	Local Authorities and Energy Scheme developers (in respect of individual projects)	Annual (subject to data availability)	DESNZ

AoS Objective	Monitoring measure / indicator	Target	Data Source	Suggested frequency	Responsibility
		subject to loss or degraded condition.			
Objective 11: Improve health and well-being and safety for all citizens and reduce inequalities in health	Households living in fuel poverty	Year on year reduction in numbers living in fuel poverty	Environment Agency, Public Health bodies including those in Devolved Administrations and Agencies	Annual	DESNZ supported by relevant authorities
Objective 12: Promote sustainable transport and minimise detrimental impacts on strategic transport network and disruption to basic services and infrastructure	Proportion of new Energy Schemes with Transport Management Plans that emphasise sustainable transport modes including public and active travel	100% of new Energy schemes	Local Authorities and Energy Scheme developers (in respect of individual projects)	Annual	Energy Scheme developers and Operators (in respect of individual projects / facilities) – reporting to DESNZ
Objective 13: To promote a strong economy with opportunities for local communities	GVA per capita and percentage change in employment and or number of apprenticeships / training schemes in areas of proposed Energy Schemes	Increase employment and apprenticeships / training schemes	NOMIS / Office for National Statistics	Annual	DESNZ supported by relevant authorities

AoS Objective	Monitoring measure / indicator	Target	Data Source	Suggested frequency	Responsibility
	Monitoring of social issues and level of social / health provision in areas of proposed energy schemes.	To inform scheme development – ensure appropriate level of provision	Local Authorities and Energy Scheme developers (in respect of individual projects)	Annual	Energy Scheme developers and Operators (in respect of individual projects / facilities) – reporting to DESNZ
Objective 14: Promote sustainable use of resources and natural assets	Proportion of construction materials used in new Energy schemes derived from alternative secondary and / or recycled sources.	100% of Energy schemes employing reuse, recovery and recycling practices during construction	Local Authorities and Energy Scheme developers (in respect of individual projects)	Annual	Energy Scheme developers and Operators (in respect of individual projects / facilities) – reporting to DESNZ
	Proportion (by mass) of waste arising associated with new Energy schemes which is reused or recycled	Year-on-year increase in % of waste materials generated during construction being reused on-site	Local Authorities and Energy Scheme developers (in respect of individual projects)	Annual	Energy Scheme developers and Operators (in respect of individual projects / facilities) – reporting to DESNZ

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