



UK Government

National Policy Statement for new Nuclear (EN-7)

Appraisal of Sustainability – Report

November 2025



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Non-Technical Summary

National Policy Statements (NPSs) set out the government's objectives and policy for the development of nationally significant infrastructure in a particular sector and provide the framework within which the Planning Inspectorate makes recommendations to the relevant Secretary of State as to whether major infrastructure development should proceed or not. During development of a new nuclear NPS EN-7, it is critical that consideration is made of the implications of implementing the NPS. In order to help understand this, a process known as an Appraisal of Sustainability (AoS) is carried out as the EN-7 is developed.

The AoS fulfils the requirements of the Environmental Assessment of Plans and Programmes Regulations 2004 (as amended), known as the Strategic Environmental Assessment (SEA) Regulations and the Planning Act requirement 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).

It should be noted that this new Nuclear NPS EN-7 is part of a suite of Energy NPSs which have been published previously. These are:

- EN-1: Overarching National Policy Statement for Energy
- EN-2: National Policy Statement for Natural Gas Generating Infrastructure
- EN-3: National Policy Statement for Renewable Electricity Generation
- EN-4: National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines
- EN-5: National Policy Statement for Electricity Networks Infrastructure

Note that EN-6 National Policy Statement for new Nuclear Generation greater than 1GW has not been updated as part of the suite of ENs above. 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 until such point that a new NPS is designated. Nuclear NPS EN-7 is a new technology specific NPS for nuclear electricity generation deployable after 2025 which is being developed to sit alongside EN-1.

AoS was completed previously of EN-1 to EN-5 and has helped to inform consideration of the new EN-7. The Overarching NPS for Energy (EN-1), which sets out the background on the planning regime and government policy on energy and energy infrastructure, should be read in conjunction with EN-7 and this AoS.

Habitats Regulations Assessment (HRA) of EN-7 has been undertaken in parallel to the AoS and its results incorporated into the AoS as appropriate, though it has been reported separately to the AoS, in order to meet the requirements of the Habitats Regulations.

It is to be noted that the NPS will remain in force unless withdrawn or suspended in whole or in part by the Secretary of State. For the purposes of the AoS consideration has been made of the construction, operation and decommissioning phases of the nuclear technologies promoted by EN-7. This is a considerable period of time, potentially lasting well over 100 years.

The AoS applies to the same geographical area of the NPS – namely England and Wales, although in certain circumstances elements will apply to Scotland and assessments have been made for a variety of expected sustainability effects within this geographical area as well as in Northern Ireland thus covering the whole of the United Kingdom. However, it is important to note that while the NPS acknowledges there are existing nuclear generating sites in England and Wales that could potentially be part of the new nuclear solution, the NPS does not prescribe the location for new nuclear infrastructure projects. As such 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 to a new nuclear site affecting a local housing settlement in the vicinity). 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 process followed for the AoS

There are 5 stages in the AoS process. The first 3 stages, as described below, have been completed thus far:

Stage 1: Identifying other plans, programmes and sustainability objectives that inform and influence the development of EN-7; establishing an understanding of the social, environmental and economic current and future baseline conditions of the UK, with particular emphasis on England and Wales; identifying key sustainability issues in England and Wales; outlining AoS Objectives against which to later evaluate the proposals for EN-7; and gathering consultation feedback on the proposed breadth of coverage and level of detail for the AoS.

Stage 2 – Initial assessment of the proposals set out in EN-7 (with reference to the wider NPS EN-1) against the AoS Objectives and provision of recommendations to enhance their sustainability ; assessing alternatives to key policy stances in EN-7; completing an assessment of the preferred EN-7; identifying the cumulative, synergistic and indirect effects likely to arise as a result of the implementation of the preferred proposals in EN-7; identifying appropriate mitigation to avoid predicted negative effects; and identifying a suitable monitoring programme for significant effects.

Stage 3 – Preparing AoS Report to accompany the EN-7 for public consultation (2025). This is the current stage.

Stage 4- Preparing revised SA Report taking on board public consultation comments and changes to the NPS to accompany EN-7 at designation (expected 2025).

Government will consider comments received during public consultation, and EN-7 will be subject to approval by Parliament before final designation. Upon designation of EN-7, 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 in EN-7. It will also provide further information on how monitoring of the significant effects of implementing EN-7 will be carried out.

The process followed for the Habitats Regulations Assessment

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.

A HRA report was prepared for EN-7 that sets out the consideration of its designation on habitat sites.

The AoS Framework

The establishment of appropriate objectives and guide questions (AoS Framework) is central to the appraisal process and provides a method to enable the consistent and systematic assessment of the effects of implementing EN-7. 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 were also developed for each of the objectives to illustrate its relevance to nuclear energy infrastructure development and give more detail and focus to the appraisal process. The questions asked explore direct, indirect as well as cumulative and synergistic effects where appropriate for the different technologies. Table below sets out the final AoS Framework.

No	AoS Objective	Guide Questions
1	Consistent with the national target of reducing carbon emissions to Net Zero by 2050	<p>Will the new Nuclear NPS...</p> <ul style="list-style-type: none"> • Reduce carbon emissions of the national portfolio of major energy infrastructure? • Reduce direct and indirect emissions of all greenhouse gases, including carbon dioxide, during construction, operation and decommissioning? • Use carbon removals to offset residual emissions from energy such Negative Emissions Technologies (NET) and Nature Based Solutions (NBS)? • Create new carbon sinks/removals through natural sequestration including that by natural habitats, blue-green infrastructure and soils?
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 *	<ul style="list-style-type: none"> • Will the new Nuclear 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? • 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?

	<p>*Adaptation is about taking steps to live with the effects of climate change such as building quay walls and flood barriers.</p> <p>Resilience is the ability of a system to adsorb and bounce back after an adverse event.</p>	<ul style="list-style-type: none"> • Ensure provision of appropriate compensatory measures is in place when there is no other option to land take from areas of flood plain? • Manage the risks of flooding and coastal erosion, particularly through working with natural processes?
<p>3</p>	<p>Enhance biodiversity and ecological networks, deliver biodiversity net gain, protect and support ecosystem resilience and functionality</p>	<p>Will the new Nuclear NPS...</p> <ul style="list-style-type: none"> • Protect and enhance nationally designated sites such as SSSIs, 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? • Reduce or avoid impacts to habitats with important roles in carbon sequestration? • Promote new habitat creation or restoration and linkages with existing habitats? • Encourage sensitive or nature inclusive design in terrestrial and marine environments?

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		<ul style="list-style-type: none"> • 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	<p>Protect and enhance sites designated for their international importance for nature conservation purposes</p> <p><i>(linked to separate HRA process for new Nuclear NPS)</i></p>	<p>Will the new Nuclear NPS...</p> <ul style="list-style-type: none"> • 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) both onshore and offshore? • Support continued improvements to the condition status of the UK's national site network?
5	<p>Protect and enhance cultural heritage assets and their settings, and the wider historic environment</p>	<p>Will the new Nuclear NPS...</p> <ul style="list-style-type: none"> • 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?

		<ul style="list-style-type: none"> • 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	<p>Will the new Nuclear NPS...</p> <ul style="list-style-type: none"> • Ensure avoidance of development in National Parks and National Landscapes (formerly AONBs)? • Support the integrity of any areas designated for landscape value and natural beauty, 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 and light pollution from construction and operational activities on residential amenity and on sensitive locations, receptors and views? • Prevent reduced tranquillity /preserve tranquillity? • 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?
7	Protect and enhance the water environment	<p>Will the new Nuclear NPS...</p> <ul style="list-style-type: none"> • Protect ground, surface, estuarine and coastal water quality in line with Water Framework Directive and Marine Strategy Framework requirements?

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		<ul style="list-style-type: none"> • 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 local, regional, national and international scale	<p>Will the new Nuclear NPS...</p> <ul style="list-style-type: none"> • 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	<p>Will the new Nuclear NPS...</p> <ul style="list-style-type: none"> • 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 reduce soil quality degradation? • Seek to remediate contaminated land?
10	Protect, enhance and promote geodiversity	<p>Will the new Nuclear NPS...</p> <ul style="list-style-type: none"> • Protect and enhance geodiversity resource? • Protect or enhance SSSIs designated for their geological interest?

		<ul style="list-style-type: none"> • 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	<p>Will the new Nuclear NPS...</p> <ul style="list-style-type: none"> • Prevent accidental radioactive discharges or exposure to radiation, including interim storage of waste that may adversely affect the health of local communities? • Lead to concerns / perception of increased risk? • Minimise issues that can affect communities and their facilities including air, noise and light pollution, as well as vibration? • Result in the 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? • Reduction of inequalities between different groups in society?
12	Promote sustainable transport and minimise detrimental impacts on strategic transport network and disruption to basic services and infrastructure	<p>Will the new Nuclear NPS...</p> <ul style="list-style-type: none"> • 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? • Reduce travel distances to work and reduce the need for out commuting?

<p>13</p>	<p>Promote a strong economy with opportunities for local communities</p>	<p>Will the new Nuclear NPS ...</p> <ul style="list-style-type: none"> • 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, house prices and land values? • Have disproportionate effects on specific groups? • Delivery of infrastructure to support economic investment in the local economy?
<p>14</p>	<p>Promote sustainable use of resources and natural assets</p>	<p>Will the new Nuclear NPS...</p> <ul style="list-style-type: none"> • Provide for safe and secure interim storage of nuclear and other wastes where necessary? • 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?

Approach to Appraisal

The appraisal of EN-7 was undertaken in a topic by topic manner, tested against each of the 14 AoS objectives.

The appraisal is done in accordance with the criteria set out in Annex II of the ODPM guidelines. In predicting effects, changes to the baseline which would occur as a result of implementing EN-7 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 5 categories set out in the following table:

Key to appraising significance of effect

Effect significance	Effect 'Score'	Rationale for significance of effect
Significant positive effect considered likely	++	Policy is expected to address an existing sustainability problem or deliver sustainability enhancements, such as substantial environmental net gain above existing/emerging policy.
Minor positive effect considered 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 considered 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.

Effect significance	Effect 'Score'	Rationale for significance of effect
Significant negative effect considered 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).

AoS of reasonable strategic alternatives for implementing the aims of EN-7 was also undertaken. To maintain the AoS at a level proportionate to the level of detail within the NPS, the strategic alternatives were assessed at a higher level than the AoS Framework by using 6 sustainable development themes, identified through aggregating the AoS objectives into topics that better reflected the strategic characteristics of the options.

Headline SD Themes	AoS/SEA Objectives (numbers refer to AoS objectives)
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), Landscapes and Townscapes (6)
The Natural Environment	Adaptation and Resilience (2), Biodiversity (3 & 4), Heritage (5), Landscapes and Townscapes (6), Water (7), Soils (9), Geodiversity (10)

In order to draw comparison between alternatives on a broad level, the following scale was used:

Scale	Description
Large Positive	A materially different positive outcome is anticipated compared to EN-7
Positive	A more positive outcome is anticipated compared to EN-7
Neutral	This alternative is anticipated to have the same outcome as EN-7
Negative	A more adverse outcome is anticipated compared to EN-7
Large Negative	A materially different adverse outcome is anticipated compared to EN-7

Summary of key AoS findings for EN-7

Objective 1: Reducing Carbon emissions to Net Zero

It is considered that minor negative effects are predicted in the short (construction), medium (operation) and long (decommissioning) term reflecting the residual emissions from nuclear infrastructure associated with transportation and embodied carbon. These negative effects can be balanced by negative emissions through voluntary or sectoral arrangements but there is no certainty at present of when these arrangements will come into place. Significant beneficial effects are predicted in the medium term i.e. during operation due to the production of low carbon energy over the lifetime of the nuclear infrastructure. Decommissioning in the long term will likely bring temporary minor negative effects similar to those for construction but effects will eventually become neutral through the cessation of operational aspects.

Objective 2: Maximise adaptation and resilience to climate change

It is considered that the application of requirements in EN-1 and draft EN-7 will maximise adaptation and resilience to climate change of nuclear infrastructure through promoting future proofing against the effects and risks of climate change in coastal, estuarine and lacustrine locations, and working with natural processes to minimise such effects and risks, with significant beneficial effects predicted over the short, medium and long term.

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

It is considered that the policies set out in EN-7 (with reference to EN-1) thoroughly address the need to enhance biodiversity and ecological networks, deliver biodiversity net gain, as well as protect and support ecosystem resilience and functionality. EN-1, for example, notes 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 also set out that 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. EN-1 also sets out 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.

In terms of nature conservation designations, EN-1 notes 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. EN-1 suggests 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. The same level of protection through EN-1 is 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. EN-1 also suggests 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, EN-1 suggests 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.

Importantly, as described above, EN-7 adds new policy at two levels which could act to reduce the significance of negative effects. The requirement for applicants to assess, at the earlier site selection stage, whether the need to implement the mitigation hierarchy (set out in EN-1) may make one or more reasonable alternative sites more suitable than the proposed site. This may result in focusing new nuclear development sites in rural areas of lesser biodiversity value—focusing on such areas and not on those of higher value would allow for less effect on biodiversity and make an application more straightforward as there would be less requirement for mitigation and net gain would be easier to achieve. Then, during project development, in addition to the options for addressing the mitigation hierarchy set out in EN-1, the applicant must implement further possible mitigation or avoidance options including variations to building layout to avoid ecologically sensitive areas and on-site measures to protect habitats and species and to avoid or minimise pollution and the disturbance of wildlife. This will act to further reduce the significance of any negative effects on site and in the immediate vicinity, both during construction and operation.

It is therefore possible to conclude that there will generally be minor negative effects in the short and medium term to designated sites of international, national and local importance, protected species, habitats and other species of importance for the conservation of biodiversity

as a result of nuclear development coming forward under EN-7 It would be only in the most exceptional circumstances, where it can be demonstrated that the benefit and need of the development outweighs the loss, harm or deterioration, that the Secretary of State would grant consent under the provisions of EN-1 for any such developments with resulting significant negative effects.

During operation, permanent structures associated with new nuclear development in the coastal, estuarine and lacustrine environment have the potential to alter aquatic processes and wave regimes and affect aquatic species. Such species can also be disturbed throughout operation from noise and changes to water quality from cooling water discharge, maintenance dredging or vessel movements. On land, permanent changes to surface water and groundwater hydrology due to the presence of buildings, foundations, roads and other infrastructure would also be expected during the operational phase potentially impacting surrounding habitats. It is therefore concluded that there will likely be significant negative effects during the operational phase.

Decommissioning could bring negative effects on biodiversity through potential habitat loss and disturbance due to the type of de-construction activities involved. However, mitigation measures such as those utilised during construction can reduce adverse effects, while beneficial effects could be experienced through the cessation of operational aspects such as cooling water discharge and the potential creation of new habitats and biodiversity enhancement through returning the land to previous land uses or other compatible uses.

Significant beneficial positive effects are anticipated in the medium and long term, through the clear approach noted in EN-1 of using the mitigation hierarchy and delivering biodiversity enhancement through an obligation to deliver Biodiversity Net Gain outside national designations. This means that locally designated sites and other habitats areas onsite and/or offsite of a nuclear site will be enhanced as a result of nuclear development.

It is to be noted that the strategic nature of EN-7 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.

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

Draft EN-7 has been subject to Habitats Regulation Assessment (HRA) to determine whether the 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. Given the strategic nature of the draft EN-7 and the lack of geographically specific proposals, it allows for potential nuclear energy development to take place in any part of England and Wales and territorial waters. As such, it was not possible for the HRA to conclude that there will be no effects on the integrity of Habitat Sites as a result of development coming forward under the draft EN-7.

Therefore, there is potential for significant negative effects on Habitats Sites as a result of the 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.

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

It is considered that there is the potential for minor negative effects (including cumulative effects) on heritage assets in the short, medium and long term as a result of the potential impacts on heritage 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 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 are addressed through the robust approach outlined in EN-7 (with reference made to EN-1).

Note is also made in EN-7 that engagement should take place with Historic England and / or Cadw, as well as relevant local authorities in respect of the historic environment and heritage and it is considered that this will help ensure full consideration of potential affects and how best to address these.

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

Significant negative effects for landscape, townscape and visual receptors are likely as a result of the implementation of EN-7 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. Large scale generating sites are likely to have greater significant adverse effects, though it is considered significant effects are also likely for smaller SMR and AMR technology.

However, EN-7 (in combination with EN-1) sets out a robust approach to addressing impacts on landscape, townscape and seascape across the relevant timeframes. Although still considered significant, there is a potential for adverse landscape effects to be reduced as decommissioning progresses.

It is also worth noting that some areas may also consider existing infrastructure, including nuclear generating facilities, as reflective of local character, or a key element of the local landscape. As such, it cannot be assumed that all largescale development is automatically considered as negative. EN-7 notes that Good Design principles may enable the nuclear infrastructure to mitigate any negative visual impacts and potentially make a positive contribution to the character of its host location and community. Consultation is encouraged with a range of bodies, including local authorities.

Objective 7: Protect and enhance the water environment

Minor negative effects for water quality are likely as a result of the implementation of EN-7 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 proposed nuclear developments, for example through construction activities as well as the need for cooling water abstraction and discharge. Across all timescales, there is potential for the measures outlined above, along with statutory requirements and controls to mitigate these risks, though some adverse effects will remain. These could be significant during operation, particularly if the cooling system requires large volumes of water. The effects identified are uncertain as they will depend on the specific locations and scale of development. Should a dry cooling system be used adverse effects may be minor during operation, given the mitigation and controls outlined.

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

While EN-1 notes a robust approach to managing effects on air quality, it is anticipated that effect on air quality is still expected to be slightly adverse, due to the potential for emissions of air pollutants at all life stages of a nuclear power station. The construction of a nuclear power station is likely to have some localised adverse effects on air quality in the short term, including dust and emissions from construction vehicles, heavy goods vehicles (HGVs), and traffic movements generated by the construction workforce. This has the potential to affect residential properties along local access/haul routes in the immediate surrounding area as well as ecological receptors. It is anticipated that effects on air quality can be minimised through good construction practices such as effective dust suppression, careful management of earthworks and a robust monitoring programme and the adherence to required consent/permits. Operation is expected to generate emissions from plant / machinery and traffic which could potentially affect properties and ecological receptors. However, mitigation measures including promotion of sustainable transport (through robust transport planning) could successfully reduce emissions to acceptable levels. Similar effects on air quality from decommissioning to those during the construction phase are expected. However, emissions are anticipated to be lower than those during the construction phase because of expected advances in zero emissions vehicles and machinery by the time decommissioning takes place together with the need for less earth movements and less transportation of materials off the site as compared to construction. Adherence to similar mitigation measures as during the construction phase would also reduce effects.

Objective 9: Protect soil resources and avoid land contamination

Minor negative effects on soil resources are likely as a result of the implementation of EN-7 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 infrastructure. The effects identified are uncertain as they will depend on the specific nature, location and scale of development – loss of greenfield sites can be considered to be likely more significant than the re-use of brownfield / previously developed land.

The mitigation outlined in EN-7 (with reference to EN-1) has the potential to ensure that nuclear infrastructure development 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.

However, while it is considered that effects can be largely mitigated, the long term significance of these effects remains uncertain, as the effectiveness of the mitigation possibilities will depend on the individual sensitivities of the receiving sites, in the context of specific details of the development design, layout and operation.

Objective 10: Protect, enhance and promote geodiversity

There is potential for 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. However, due to the potential for enhancement of geological features (or increasing access etc.) outlined in EN-1 and EN-7, there is also potential for minor positive effects in the medium to long term.

Nevertheless, it is important to note that 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.

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

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.

EN-7 (with reference to EN-1) also makes clear recognition of 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. Beneficial effects will be from the short through to the long term.

It is also made clear in EN-7 that safety systems are / will be in place in the designs of nuclear infrastructure and compliance with the UK's robust legislative and regulatory regime means that the risk of radiological health detriment posed by nuclear infrastructure (both during normal operation and as a result of an unplanned release) is extremely small. EN-7 notes that the risk of an accident involving nuclear facilities is extremely unlikely and sets out a range of aspects which deal with that issue. For example, note is made that nuclear facilities are designed and operated with multiple safety systems in place, using a 'Defence in depth' approach. As such, it

is considered that any wider risk to health from development of nuclear generation is robustly addressed.

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

EN-7, supported by EN-1, provides 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 undertake transport assessment and include Travel Plans and this would help to ensure that all aspects of effect on the transport network can be achieved. As such, while it is anticipated that uncertain effects may be experienced in the short (construction) term, benefits should be experienced across the later timescale of the development.

Objective 13: Promote a strong economy

Development of new nuclear generating 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 less jobs during operation and then an increase during any decommissioning phase. A significant increase in workers can lead to stress on local housing and labour markets (particularly in more rural areas / smaller towns), however, EN-7, with reference to EN-1, sets 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 the NPS will 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.

Objective 14: Promote sustainable use of resources and natural assets

EN-7, supported by the approaches outlined in EN-1, provides 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 is also made in EN-1 of a number of key aspects such as the waste hierarchy, and the requirement 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.

EN-7 sets out at length how waste specific to the nuclear industry is to be managed. This notes that most waste from nuclear sites can be disposed of to conventional facilities or specialised near-surface disposal facilities. However, some waste will require special handling and disposal, potentially for a significant period of time after the nuclear facility has stopped generating power. This will be achieved via the current and any future approaches set by the relevant Nuclear Regulatory bodies, with ultimately a geological disposal facility being developed. Prior to that, EN-7 makes note that there will be a requirement to demonstrate that there will be safe, secure and environmentally acceptable interim storage arrangements.

As required by the SEA Directive, the AoS of EN-7 also includes an assessment of reasonable alternatives to the policies set out at a strategic level. Three reasonable alternatives were considered against headline sustainable development themes. The alternatives were:

1. **NPS provides full protection to highest priority designated habitats** (SAC, SPA, MCZ, RAMSAR) – nuclear infrastructure development will not be granted DCO where it will inevitably (i.e. after reasonably practicable mitigations) cause residual harm to those sites.
2. **NPS provides full protection to highest priority designated landscapes and cultural sites** (national landscapes and heritage sites) – nuclear infrastructure development will not be granted DCO where it will inevitably (i.e. after reasonably practicable mitigations) cause harm to the visual character and cultural and/or historical significance of those sites.
3. **NPS specifies the use of alternative cooling technologies** to mitigate the environmental impact of nuclear power station cooling water abstraction and discharge, and the visual impact of natural draft cooling towers and steam plumes.

An overview of the consideration of each alternative is as follows:

Alternative 1

In relation to the highest priority designated habitats (SAC, SPA, MCZ, RAMSAR), the approach taken by EN-7 means that DCO may be granted even though there is significant residual harm to those Habitat sites. Alternative 1 would provide full protection in relation to the same sites from residual harm through not allowing derogations.

In respect of climate change, it is considered this alternative would allow for better protection of Habitats sites than EN-7, including those which would have particular importance for sequestration of carbon (e.g. peat bogs, forests, grasslands, parts of the marine environment etc.). As such, it is considered inclusion of this alternative would have a Positive effect in respect of Climate change (Net Zero) targets.

However, in terms of security of energy supply, it is considered that an alternative provides full protection in respect of Habitats sites could potentially reduce the availability of otherwise suitable nuclear sites and reduce the likelihood of the UK meeting targets related to domestic low carbon energy generating capacity, as compared to EN-7. Restricting the potential for

development could also reduce the overall economic output of the UK. As such, it is considered inclusion of this alternative would have a Negative effect in respect of security of energy supply.

Positive benefits could be anticipated from this alternative in respect of health and wellbeing as compared to EN-7. Such Habitats sites protect and maintain areas of the most valuable habitat, which, in addition to being of critical importance to biodiversity, are recognised as having health and wellbeing benefits to people through allowing access to nature and performing air and water pollution cleansing.

In economic terms, it is considered that this alternative could result in areas being excluded from potential nuclear infrastructure development as compared to EN-7. This could potentially reduce the availability of otherwise suitable sites. Such areas could lose out on economic benefits that would be anticipated from the development of nuclear infrastructure (well paid job opportunities, opportunities for suppliers etc.). As such, it is considered inclusion of this alternative would have a Negative effect in respect of the economy.

It is considered that this alternative would have no strategic implications for the built environment – the Habitat sites noted in this alternative relate to those sites designated at the highest level (European / International) for nature conservation. As such, it is considered inclusion of this alternative would have a Neutral effect in respect of the built environment in comparison to EN-7.

This alternative would provide for better protection for the Habitats sites as nuclear infrastructure development will not be granted be granted DCO where it will inevitably (i.e. after reasonably practicable mitigations) cause residual harm to those sites. As such, by protecting such areas, it is considered inclusion of this alternative would have a Large Positive effect in respect of the natural environment in comparison to EN-7.

Sustainable development theme	Alternative 1
Climate Change (Net Zero)	Positive
Security of Energy Supply	Negative
Health and Wellbeing	Positive
The economy	Negative
The built environment	Neutral
The natural environment	Large Positive

Alternative 2

In relation to the highest priority designated landscapes and cultural sites (national landscapes and heritage sites), the approach taken by EN-7 means that DCO may be granted where it will inevitably (i.e. after reasonably practicable mitigations) cause harm to the visual character and cultural and/or historical significance of those sites. Alternative 2 would provide full protection in relation to the same landscapes and cultural sites.

In relation to climate change, it is considered that this alternative allows for better protection for sites that, in addition to being National Landscapes, could include areas of importance for sequestration of carbon (e.g. peat bogs, forests, grasslands). As such, it is considered inclusion of this alternative would have a Positive effect in respect of Climate change (Net Zero) targets in comparison to EN-7.

However, this alternative could result in areas being excluded from potential nuclear infrastructure development. This could potentially reduce the availability of otherwise suitable sites and reduce the likelihood of the UK meeting targets related to domestic low carbon energy generating capacity. Restricting the potential for development could also reduce the overall economic output of the UK. As such, it is considered inclusion of this alternative would have a Negative effect in respect of security of energy supply as compared to EN-7.

In respect of health and wellbeing, it is considered that this alternative could result in protection of sites which would have benefits in terms of health and wellbeing. In short, such designated sites protect and maintain areas / features that can provide a 'sense of place' for people, as well as a connection to their heritage – this is widely recognised as having positive wellbeing effects. As such, it is considered that this alternative would have a Positive effect in respect of health and wellbeing.

In economic terms, it is considered that this alternative could result in areas being excluded from potential nuclear infrastructure development. This could potentially reduce the availability of otherwise suitable sites. Such areas could lose out on economic benefits that would be anticipated from the development of nuclear infrastructure (well paid job opportunities, opportunities for suppliers etc.). As such, it is considered inclusion of this alternative would have a Negative effect in respect of the economy in comparison to EN-7.

The built environment plays a key role in landscape and cultural sites. As such, an alternative which results in removing the potential for nuclear infrastructure development in those areas considered highest priority designated landscapes, or cultural sites would likely be significantly beneficial in ensuring that the quality and setting of such features is maintained. As such, it is considered inclusion of this alternative would have a Large Positive effect on the built environment as compared to EN-7.

This alternative is focused on highest priority designated landscapes (national landscapes) and cultural sites and it is to be recognised that such areas play an important role in maintaining the natural environment, by restricting development that is not appropriate to the scale or context of the area. As such, by protecting such areas, it is considered inclusion of this

alternative would have a Positive effect in respect of the natural environment as compared to EN-7.

Sustainable development theme	Alternative 2
Climate Change (Net Zero)	Positive
Security of Energy Supply	Negative
Health and Wellbeing	Positive
The economy	Negative
The built environment	Large Positive
The natural environment	Positive

Alternative 3

EN-7 promotes a range of cooling technologies which include direct wet cooling, indirect wet cooling, dry cooling and hybrid cooling. Alternative 3 excludes direct wet and indirect cooling from the mix of cooling technologies.

In terms of climate change, it is considered that this alternative would have no implications in comparison to EN-7. It is anticipated that all nuclear generating stations will produce energy in line with net zero targets, no matter the specific technical detail of how they are cooled. As such, it is considered inclusion of this alternative would have a Neutral effect in respect of climate change.

It is also considered that this alternative would not allow the full range of potential sites as set out in EN-7 to be utilised, with areas being effectively excluded from potential nuclear infrastructure development and as such would reduce the availability of otherwise suitable sites and reduce the likelihood of the UK meeting targets related to domestic low carbon energy generating capacity. As such, it is considered this alternative would have no implications in comparison to EN-7 and this alternative would have a Negative effect in respect of security of energy supply.

In terms of health and wellbeing, it is considered that this alternative would have no implications – it is anticipated that all cooling technologies will be operated in a manner which protects health of the local and wider population. As such, it is considered inclusion of this alternative would have a Neutral effect in respect of health and wellbeing.

In economic terms, it is considered that this alternative could result in less sites being potentially viable for the development of nuclear generating infrastructure with a result that some areas could lose out on economic benefits that would be anticipated from such development. As such, it is considered inclusion of this alternative would have a Negative effect on the economy in comparison to EN-7.

A range of alternative cooling technologies would potentially allow for consideration of greater / more effective mitigation of effects on those areas of landscape value – i.e. some cooling technologies would allow for the removal of cooling towers, with beneficial effects on landscape. Similarly, this could better protect the setting of some cultural heritage assets. As such, it is considered inclusion of this alternative would have a Large Positive effect on the built environment.

Use of alternative cooling technologies would allow for a greater range of locations to be considered for the development of nuclear infrastructure, including areas which may have less environmental features of interest and thus lead to lower impacts. Alternative cooling technologies could mean that some pressures on the natural environment can be reduced or avoided. Such cooling technologies would have less requirement, or no requirement, to abstract or discharge large volumes of water therefore resulting in less or no impacts on receiving waters quantity and quality and on aquatic biodiversity. As such, it is considered that the use of alternative cooling technologies would allow for Potential Large positive effects on the natural environment to be realised.

Sustainable development theme	Alternative 3
Climate Change (Net Zero)	Neutral
Security of Energy Supply	Negative
Health and Wellbeing	Neutral
The economy	Negative
The built environment	Large Positive
The natural environment	Large Positive

None of these alternatives are as good as, or better than, the proposals set out in EN-7 and therefore the government’s preferred option is to take forward the new nuclear EN-7. Note that the British Energy Security Strategy emphasises the importance of addressing underlying

vulnerability to international energy prices by reducing dependence on imported oil and gas, and accelerating deployment of nuclear, other energy technologies and related network infrastructure. EN-7 is part of a suite of approaches that reflect these wider requirements by introducing greater flexibility in energy infrastructure provision at the national level.

Cumulative effects

It is a requirement to consider cumulative, synergistic and indirect effects of implementation of EN-7. These effects arise where several proposals or elements of EN-7 combine, maybe because they are being constructed at the same time, or constructed in the same vicinity. Such effects can occur not just between elements of nuclear infrastructure, but with other types of energy infrastructure also, as well as other general developments.

As EN-7 is closely linked to the wider NPS as a whole (EN-1 in particular), consideration was made of all aspects of the NPS. Key elements identified include the need to reduce GHG emissions in order to help combat climate change. It was shown that the NPS had a key focus for low or net zero carbon energy generation and transmission. The development of new nuclear generating infrastructure would be aligned with this approach to low carbon energy generation (notwithstanding issues relating to embodied carbon in infrastructure construction).

The issue of clustering of installations was also addressed as part of the consideration of the wider NPS and it was noted that there could be both beneficial and negative effects with this aspect. An example was given of how if there were a number of projects being developed within a region and in a similar timeframe, it can affect local economies and labour supply markets, as well as drive up demand for housing and accommodation as well as local services. This could also lead to a shortage of skilled workers in a local area. On the other hand, it was considered that 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 the case that, due to the typical scale of nuclear generation facilities (particularly large GW scale facilities), these issues would also be relevant to the development of new nuclear facilities.

New nuclear generation, as with the wider energy infrastructure development, is also considered to provide cumulative benefit to the population as a whole by helping to ensure certainty of investment and security of energy supplies.

Of course, in addition to effects on people, there are also likely to be effects on the environment. This can be anticipated to be cumulatively greatest and more significant when infrastructure (nuclear or otherwise) is clustered. As with all effects set out across the NPS, the particular significance would depend on precise location, scale, technology to be deployed and the environmental context of the area. In specific relation to nuclear generating infrastructure, the location chosen has frequently been areas that are also notable for landscape such as open areas of coastline, though the future use of smaller sites for SMR and AMR technologies may allow such effects to be reduced, or for a greater range of locations to be considered.

However, these new ‘smaller’ technologies may also allow for multiple reactors to be placed in one area, with potential for other cumulative effects. Aspects such as these are set out in detail in EN-7 which notes a range of potential impacts of multiple reactors.

On the whole, it can be anticipated that no matter what technology or approach is taken, there will still likely be 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 and may be difficult to mitigate (again depending on the precise details of any scheme). As such, the NPS as a whole (including EN-7) places a 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.

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 precise nuclear infrastructure project proposed and the sensitivity of the receiving communities and environment. EN-7 (supported by the wider NPS) sets out a series of approaches that will address and manage these issues.

Nevertheless, in order to fully understand the potential for and likely extent of cumulative effects, details of when projects will be developed, as well as details of the precise location and technology to be used, would need to be known for both the proposed nuclear infrastructure development, as well as other developments. As noted, both EN-1 and EN-7 require the undertaking of Environmental Impact Assessment for relevant energy infrastructure schemes. Consideration of cumulative effects is a requirement of EIA and as such, the potential for cumulative effects (in light of the particular circumstances of the development) would be considered through that mechanism. Similarly, other development types (potentially outside the energy sector) would also be subject to the EIA Regulations and would, as a matter of course, consider the potential for cumulative effects between that development and any nuclear energy infrastructure.

Transboundary effects

Potential transboundary effects from the implementation of EN-7 considers 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.

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 result 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.

It is worth noting that EN-7 considers the potential for transboundary effects and notes that applicants should make early contact with relevant statutory bodies in Scotland and Northern Ireland where there is the potential for transboundary effects on biodiversity and geological conservation, as well as water quality and resources.

It is also worth noting that EN-7 (supported by EN-1) emphasises the need for applicants to undertake an Environmental Impact Assessment. The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 ('the EIA Regulations'), require transboundary effects to be considered from any development subject to these regulations.

As such, it is considered that Ireland, France, Belgium, Germany, Denmark, Sweden and the Netherlands would be consulted on the potential for significant environmental effect from implementation of any relevant scheme that falls under EN-7 and is subject to the EIA Regulations (in England and Wales). The particular nation state(s) to be consulted would be dependent on the proposed technology and location.

EN-1 notes that 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. As such, while outside the requirements of the EIA Regulations, it is considered that due to these requirements of EN-1, when required, consultation would also take place with Norway and the Crown Dependencies of the Isle of Man and the Channel Islands.

Monitoring

Monitoring involves measuring indicators which will enable the establishment of a link between the implementation of EN-7 and the likely significant effect (positive or negative) being monitored. It thus helps to ensure that any adverse effects which arise during implementation of EN-7, whether or not they were foreseen, can be identified and that action can be taken to deal with them.

While significant effects have not been identified in relation to all Objectives and it is considered that in many instances the text within EN-7 (bolstered by that within EN-1 and the wider NPS) provides robust policy to address issues, the non-specific spatial nature of EN-7 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.

A monitoring programme has been prepared on this basis and is presented in the AoS report. It is also worth noting that the sustainability effects of EN-7 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 bodies such as UK Health Security Agency and Office for Health Improvement and Disparities.

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).

It is also the case that nuclear generating activities will be monitored through the nuclear licensing procedures. EN-7 also recognises that nuclear facilities could increase demand on health monitoring services and notes the need for close engagement with bodies such as the Health and Safety Executive and the Office for Nuclear Regulation.

As such, there is a large body of evidence that can be drawn upon to inform implementation of EN-7 and help inform any future review.

1: Introduction

This document is the Appraisal of Sustainability (AoS) report for the draft new Nuclear National Policy Statement (NPS) EN-7 published for consultation by the Secretary of State for the Department for Energy Security and Net Zero (DESNZ).

The main function of this report is to set out the likely significant effects on the environment of developing new nuclear generation infrastructure, as well as indicating how the NPS is consistent with the principles of sustainable development more generally.

The AoS report is designed to inform consultation on the new Nuclear NPS with which it is being published. It should be noted that this new Nuclear NPS EN-7 is part of a suite of Energy NPS's which have been published previously. These are:

- EN-1: Overarching National Policy Statement for Energy
- EN-2: National Policy Statement for Natural Gas Generating Infrastructure
- EN-3: National Policy Statement for Renewable Electricity Generation
- EN-4: National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines
- EN-5: National Policy Statement for Electricity Networks Infrastructure

Note that EN-6 National Policy Statement for new Nuclear Generation greater than 1GW has not been updated as part of the suite of ENs above. 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 until such point that a new NPS is designated. Nuclear NPS EN-7 is a new technology specific NPS for nuclear electricity generation deployable after 2025 which is being developed to sit alongside EN-1.

AoS was carried out previously on EN-1 to EN-5 and this has helped to inform this assessment and cross reference is made to these EN's and their assessments where appropriate and relevant. As such, this AoS report should be read in conjunction with the EN-7, and in particular with the Overarching NPS for Energy (EN-1), which sets out the background on the planning regime and government policy on energy and energy infrastructure.

This AoS Report has been developed by AtkinsRéalis Limited. The approach adopted in the 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.

Habitats Regulations Assessment (HRA) has been undertaken in parallel to the AoS and its results incorporated into the AoS as appropriate, though it has been reported separately to this AoS report, in order to meet the requirements of the Habitats Regulations.

1.2 The background and context to the new Nuclear National Policy Statement EN-7

National Policy Statements (NPSs) set out the government's objectives and policy for the development of nationally significant infrastructure in a particular sector and provide the framework within which the Planning Inspectorate makes recommendations to the relevant Secretary of State as to whether major infrastructure development should proceed or not. NPSs apply to infrastructure that is defined as a "Nationally Significant Infrastructure Project" (NSIP) and are designated under the Planning Act 2008. Their function is to state clearly how government policy applies to development consent, removing discussion of the merits of such policy from the examination process so that permitting decisions can be made on the basis of planning considerations alone.

There are currently six NPSs relevant to energy (EN-1 to EN-6) applying in England and Wales. EN-1 acts as the overarching NPS to four technology NPSs (EN-2 Natural Gas Generating Infrastructure, EN-3 Renewable Electricity Generation, EN-4 Gas Supply Infrastructure and Gas and Oil Pipelines and EN-5 Electric Networks Infrastructure). All five NPSs were designated in January 2024.

EN-6 was designated in June 2011 and lists eight sites considered potentially suitable for new nuclear power stations over 1 GW of single reactor capacity. Of these eight sites, one new nuclear power station (Hinkley Point C) was permitted under EN-6 in November 2012. A further project (Sizewell C) obtained development consent in July 2022 under Section 105 of the Planning Act 2008, rather than EN-6, due to the EN-6's deployment deadline of 2025 now being unachievable for any new nuclear power station. A new nuclear NPS is required to provide planning policy for the deployment of new nuclear power stations beyond 2025, although the Secretary of State can still grant development consent to nuclear projects under Section 105 of the Planning Act 2008, with the current EN-6 being an important and relevant consideration in the planning process. This new Nuclear NPS is known as EN-7.

Government consulted on the siting criteria and process for a new standalone nuclear NPS not linked to EN-1 in 2017/18. Since then, the government's position on nuclear has evolved as set out in the 10 Point Plan for a Green Industrial Revolution (2020), Energy White Paper (2020) and British Energy Security Strategy (2022). In the latter strategy, the government set out plans for increased deployment of civil nuclear to up to 24GW by 2050 – three times more than now and representing up to 25% of the UK projected electricity demand. In Powering Up Britain (2023), the government committed to deliver a programme of new nuclear projects beyond Hinkley Point C and Sizewell C; to set up Great British Nuclear, with the responsibility to lead delivery of the new nuclear programme; to launch a competitive process to select the best Small Modular Reactor (SMR) technologies, with the first phase commencing in April 2023; and to support the development of Advanced Modular Reactors (AMR) through the Advanced Nuclear Fund to enable deployment of a demonstration project by the early 2030s. EN-7 is set in the context of these developments, and the needs case for nuclear energy as outlined in the new EN-1.

Government has now embarked on the preparation of a new nuclear NPS (EN-7) but does not propose to list specific sites as it did for EN-6. Instead, a criteria-based approach like that of all other technology NPSs (EN-2 to EN-5) will apply. The government also proposes to remove the deadline for deployment of new nuclear power stations (which was set out in EN-6) and to set policy for Small Modular Reactors (SMRs) and Advanced Modular Reactors (AMRs) alongside nuclear power stations over 1GW of single reactor capacity. Nuclear fusion will not be specifically included in this NPS as there are plans for this to be addressed in a future separate NPS.

A separate process that also has implications for the AoS is the management of higher activity radioactive waste that will be produced by new nuclear power station. The UK Government's policy position is that, before development consents for new nuclear power stations are granted, the government will need to be satisfied that effective arrangements exist or will exist to manage and dispose of the waste they will produce. Geological disposal has been identified as the most appropriate long-term solution for managing higher activity radioactive waste and a suitable location for a Geological Disposal Facility (GDF) will be identified through a consent-based process with government and its agencies working in partnership with communities.

1.3 Purpose of this AoS Report

This AoS Report has been prepared for EN-7 which covers SMRs, AMRs and nuclear power stations over 1GW of single reactor capacity.

This AoS report has two primary functions:

- The Environmental Assessment of Plans and Programmes Regulations 2004 (as amended), known as the Strategic Environmental Assessment (SEA) Regulations (and which are derived from the Strategic Environmental Assessment Directive - 2001/42/EC), 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 NPS EN-7 is 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 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 AoS to be produced alongside the NPS while it is still in draft form, the SEA Regulations and Planning Act aim to ensure that consultees are able to review and comment on the NPS with a sense of what it would mean in environmental and wider sustainability terms for a new generation of new nuclear 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 NPS.

1.3.1 Report Structure

The remainder of this report is structured as follows:

- Overview of AoS process – section 2
- Scope of the AoS – section 3
- Policy context, baseline, issues and framework – section 4
- Baseline information and key issues – section 5
- AoS framework – section 6
- Assessment of new nuclear EN-7 – section 7
- Assessment of reasonable alternatives – section 8
- Cumulative and transboundary effects – section 9
- Monitoring – section 10

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

- Appendix A – Scoping consultation response
- Appendix B – Review of plans, policies and legislation
- Appendix C – Baseline data and contextual information
- Appendix D – Recommendations made through the AoS process
- Appendix E – Baseline maps (provided as a separate volume)
- Appendix F - Glossary

2: Overview of AoS process

2.1 Assessment methodology

The AoS process and methods that have been applied are broadly based on a number of published guidance documents (note that there is no specific guidance on preparing an AoS):

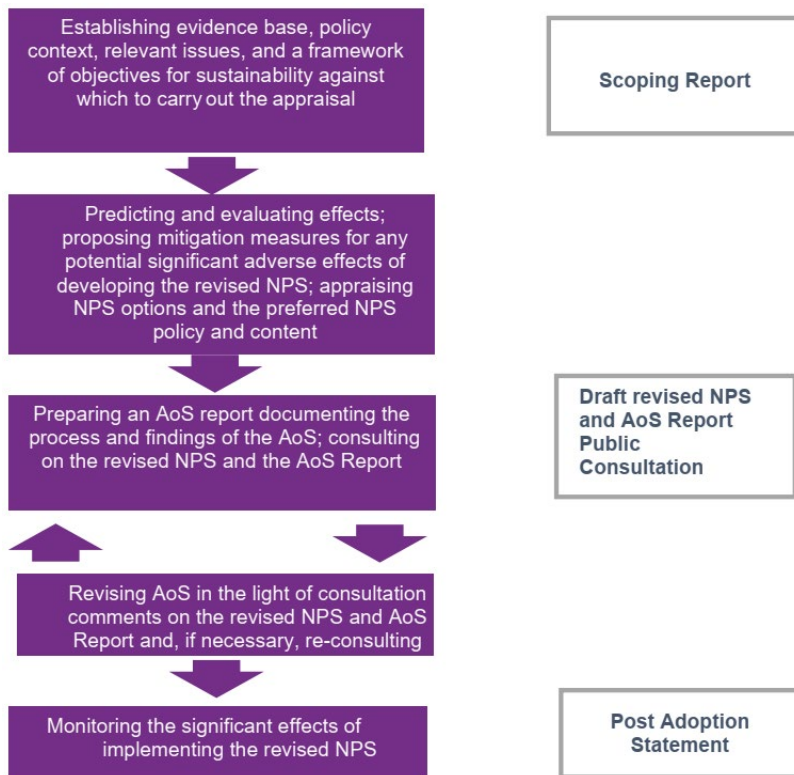
Sustainability Appraisal (SA) of Regional Spatial Strategies and Local Development Documents - Guidance for Regional Planning Bodies and Local Planning Authorities, by the ODPM, the Scottish Executive, the Welsh Assembly Government and the Northern Ireland Department of the Environment November 2005;

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, December 2023 and associated revised 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 still apply.

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



Source: 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 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 methodology that has been adopted is described below.

2.2: Setting the Context and Establishing the Baseline

The NPS will both influence and be influenced by other plans, policies and programmes (PPPs) produced by local and combined authorities, by statutory agencies and other bodies with plan making responsibilities. Legislation is a further driver that sets the framework for the NPS, both directly and indirectly. Relevant legislation, plans and programmes have been identified and considered to inform the preparation of this AoS report.

To predict accurately how NPS policies will affect the current baseline, it is first important to understand its current state and then examine the likely evolution without the implementation of the plan. 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 identified through analysis of the baseline data and review of other plans and programmes. The identification of these issues helped focus the AoS processes on the aspects that really matter. Implications to NPS development and opportunities for how the NPS could assist in addressing these issues were also identified.

A set of AoS Objectives has been developed, against which the policies in the NPS could be assessed. 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 NPS.

The scoping information was 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)¹. This consultation took place from 11 January 2024 to 10 March 2024. The consultation comments were taken on board in preparing this AoS Report (see Appendix A) and updates made are reflected in this report as appropriate.

Government has decided that an appraisal of sustainability against a separate equality objective is unnecessarily duplicative and difficult to apply at the strategic level of the nuclear National Policy Statements. Not all Appraisals of Sustainability 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.

2.3: Appraisal of NPS EN-7 Policies

The appraisal of the NPS policies has been undertaken in a topic by topic manner, with the draft NPS for nuclear (EN-7) tested against each of the 14 AoS objectives (see Section 7). Where relevant, the interactions between topics have been considered and the commentary is reported against each of the AoS Objectives.

¹ The Environment Agency, English Heritage, Natural England, Department of Agriculture, Environment and Rural Affairs (Northern Ireland), Historic Scotland, Scottish Natural Heritage, Scottish Environment Protection Agency, Cadw (Welsh Historic Monuments), Countryside Council for Wales, and the Environment Agency Wales.

The appraisal seeks to predict the significant environmental effects of the NPS2. This is done in accordance with the criteria set out in Annex II of the 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

Effect significance	Effect 'Score'	Rationale for significance of effect
Significant positive effect considered likely	++	Policy is expected to address an existing sustainability problem or deliver sustainability enhancements, such as substantial environmental net gain above existing/emerging policy.
Minor positive effect considered 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 considered 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 considered 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).

² ODPM (2005) A Practical Guide to the Strategic Environmental Assessment Directive. See Figure 5. Available online at:

<http://www.communities.gov.uk/publications/planningandbuilding/practicalguidesea>

As noted in Section 1 above, it is important to note that EN-7 is not site-specific and provides 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.

Throughout the assessment process, an iterative approach has been taken, with detailed and sustained discussions held between the AoS team and the NPS team. These discussions were informed by findings from the previous AoS undertaken of EN-1 to EN-5 alongside new findings from EN-7’s assessment. During these discussions, a series of recommendations were made to be considered in the drafting of EN-7 for public consultation. An overview of key recommendations made is provided in Appendix D.

2.5: 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 8 of this AoS Report.

It is important to maintain the appraisal at the appropriate level of plan making and AoS. 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 as follows:

Table 2-2 - Sustainable Development Themes and AoS Objectives

Headline SD Themes	AoS/SEA Objectives (numbers refer to AoS objectives)
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), Landscapes and Townscapes (6)

The Natural Environment	Adaptation and Resilience (2), Biodiversity (3 & 4), Heritage (5), Landscapes and Townscapes (6), Water (7), Soils (9), Geodiversity (10)
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Note that in consideration of Alternatives, the assessment is undertaken in comparison to EN-7 and as such, the findings of the AoS in respect of EN-7 in Section 5 broadly apply to all of the alternatives – the key differentiator being the higher level of protection provided to certain environmental assets and the cooling technologies considered.

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-7
Positive	A more positive outcome is anticipated compared to EN-7
Neutral	This alternative is anticipated to have the same outcome as EN-7
Negative	A more adverse outcome is anticipated compared to EN-7
Large Negative	A materially different adverse outcome is anticipated compared to EN-7

2.6: Cumulative and Transboundary Effects

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 nuclear 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 AoS Report for EN-1 to EN-5³ considers the likely significant effects of implementing the NPS as a whole with the mix of technologies it includes, as well as the likely specific significant generic effects associated with all major energy infrastructure for each type of technology. Specific effects associated with specific energy technology are detailed for Natural Gas Electricity Generating Infrastructure (EN-2), Renewable Energy Infrastructure (EN-3), Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) and Electricity Networks Infrastructure (EN-5).

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. As for technology specific EN-2 to EN-5, EN-7 does 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 EN-7 NPS, the baseline and the plans/programmes review.

The cumulative effects assessment has been undertaken both individually for EN-7 and also considering the cumulative effects between all six NPSs in combination.

Cumulative effects can also arise due to effects from the NPS combining with effects from other plans and policies. However, due to the strategic and high level nature of EN-7 and 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 EN-7 and the other 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. 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;

³ <https://assets.publishing.service.gov.uk/media/655dff3d544aea000dfb3287/appraisal-sustainability-main-report.pdf>

- 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):

- Resilience to climate change
- Noise, vibration and light disturbance;
- Air, land and water pollution;
- Changes to water quantity / flow and coastal change,
- Landscape;
- Species injury and mortality;
- Changes in habitat extent, composition and structure;
- Health and Wellbeing;
- Sustainable transport; and
- 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 that have been considered in the AoS include additive air quality, water quality/quantity and habitat/species disturbance impacts.

Transboundary effects extend to multiple countries rather than just the UK. Potential transboundary effects from the NPS have been 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. Transboundary effects resulting from unintended release of radiation from nuclear power stations are addressed in this AoS.

Both types of effect have been considered in relation to EN-7 NPS.

2.7: Monitoring the Effects of implementing the NPS

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. A monitoring programme has been prepared and is presented in this report.

2.7: Consultation on this AoS Report

The AoS Report is published for public consultation together with the draft NPS for Nuclear (EN-7). Please refer to the consultation document for details.

2.8: Next Steps

Government will consider comments received during the public consultation, and the NPS will be subject to approval by Parliament before final designation. Upon designation of the NPS, 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 NPS will be carried out.

2.9: Habitats Regulations Assessment

A Habitats Regulations Assessment (HRA) report has been prepared for the draft NPS in a parallel process to the AoS. The HRA report is subject to public consultation alongside the draft NPS and this AoS report.

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 European Site but which are likely to have a significant effect on one or more European Sites either individually, or in combination with other plans or projects.

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

on habitats sites, pSPAs, cSACs and listed or proposed Ramsar sites, are treated in the same way as European Sites. Hereafter, all the above sites are referred to as European Sites.

Therefore, a HRA report was prepared for the draft NPS and considers the potential effects of designating the draft NPS on European sites.

It is important to note that the Habitats Regulations require assessment of the NPS 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 NPS. Therefore, the HRA has purely focused on the policy content within the NPS and has been applied in a manner which is consistent with the non-spatial, strategic nature of the NPS which does not identify locations to construct new nationally significant infrastructure related to nuclear generation.

The HRA of the NPS noted that while the lack of spatial information within the NPS made it impossible to reach certainty on the effect of the plan on the integrity of any European Site, the potential for proposed nuclear infrastructure projects of the kind contemplated by EN-7 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 EN-7 is, 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

3.1: Technical Scope

The AoS has a very wide remit and will consider the following topics associated with the SEA regulations which require that the likely significant effects on the environment are assessed, considering the following factors and interrelationship between them:

- Biodiversity;
- Population;
- Human health (covering noise, vibration and light issues among other effects on local communities and public health);
- Fauna and flora;
- Soil;
- Water;
- Air;
- Noise;
- Climatic factors (covering GHG emissions and adaptation to climate change);
- Material assets (covering infrastructure, waste and other assets);
- Cultural heritage including architectural and archaeological heritage; and
- Landscape.

In addition, SA guidance requires the consideration of socio-economic factors alongside the environmental factors identified above.

Building on the SA/SEA themes above, and having considered the nature of the sustainability effects potentially arising from Nuclear NSIP in the UK and in neighbouring countries (see section 5 for further detail), this AoS covers the following topics:

- Biodiversity;
- Geodiversity;
- Greenhouse Gas Emissions;
- Adaptation to a Changing Climate;
- Air Quality and Noise;
- Water Resources and Quality;
- Soil and Contaminated Land;
- Historic Environment;

- Landscapes, Waterscapes and Townscapes;
- Resources and Waste;
- Economic Activity, Opportunities and Deprivation;
- Population Growth and Demographics;
- Communities: Physical Infrastructure; and
- Communities: Physical health and mental wellbeing.

It is important to note here that the AoS of EN-1 concluded that unintended release of radiation from nuclear power stations may result in transboundary effects. However, the regulatory system in existence in the UK ensures that permitted radioactive discharges are within authorised limits and are likely to remain sufficiently localised so as not to impact significantly on neighbouring countries.

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 result 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.

Data and assessment limitations

While it is considered that the datasets available provide a comprehensive overview of sustainability issues across the United Kingdom (particularly England and Wales) in respect of the technical scope of the NPS. However, it is to be noted that the scale of the assessment (applying to England and Wales as a whole) means that regional or local variations are not discernible. As such, assessments are high level and strategic in scale.

One further limitation of the assessment relates to the non-spatial nature of the NPS (EN-7). As EN-7 does 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.

Note that due to inherent uncertainty in assessment due to the non-spatial nature of EN-7, a precautionary approach has been taken to findings set out in the AoS.

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

As noted, EN-7 covers three types of nuclear generation technology (SMR, AMR and nuclear reactors over 1GW). SMR and AMR are of modular nature, of smaller output and have smaller land requirements, with the possibility of adding reactors over time at a given site and reach GW scale. Nuclear reactors over 1GW, on the other hand, are the largest output reactors and have the largest land and resources needs from the outset. Therefore, the AoS takes a conservative approach and focuses on the assessment of the effects of nuclear reactors over 1GW reflecting the larger scale of effects anticipated on any given site.

3.2: Geographic Scope

The AoS applies to the same geographical area of the NPS – namely England and Wales, although in certain circumstances elements will apply to Scotland and assessments will be made for a variety of expected sustainability effects within this geographical area as well as in Northern Ireland thus covering the whole of the United Kingdom. Consideration will also be made in the AoS of the potential for transboundary effects (i.e. on other surrounding countries to the United Kingdom).

While EN-7 acknowledges that there are a number of existing nuclear generating sites in England and Wales that could potentially be part of the new nuclear solution, it does not prescribe these locations for development. Rather the NPS is to be considered non-spatial in its application. As such, potential effects have been considered across a range of geographic scales (including international, UK, regional and local) and for transboundary effects extend beyond the geographical boundary of the NPS.

However, as the NPS does not prescribe the location for new nuclear 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 to a new nuclear site affecting a local housing settlement in the vicinity). 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 EN-1, particularly through Environmental Impact Assessment (EIA), and, where relevant, Habitats Regulations Assessment (HRA).

3.3: Temporal Scope

The temporal scope of the AoS has been aligned with that of the nuclear technologies promoted by EN-7.

Potential temporal phases of new nuclear technology have been identified as follows⁴

Third generation (Gen III) reactor – currently available Gen III reactors are similar to earlier reactors at large nuclear power stations (e.g. Sizewell B) but with enhanced thermal efficiency and a more standardised design. Additional layers of safety features address older, single point-of-failure systems, improving robustness and overall safety. They are typically 1,000-1,4000 MW. Most Gen III reactors use water as a coolant and moderator, of which Pressurised Water Reactor (PWR) designs are the most common. Gen III+ have incremental design improvements from previous versions. UK European Pressurised Reactors (EPR), a type of PWR, are currently under construction at Hinkley Point C and Sizewell C in England.

Advanced nuclear technologies (ANT) - the next generation of nuclear designs which are typically smaller than older designs and are constructed in factory built, modular sections that can be assembled onsite. They range from a few megawatts for off-grid applications, up to hundreds of megawatts. Although a few designs have been demonstrated, commercialisation will require significant further development and investment. They can be categorised into two groups:

- Small Modular Reactors (SMRs, expected generation from 2030s). Gen III watercooled designs are the most technologically mature ANTs. The modularity in some cases refers to reactors designed to be connected in clusters.
- Gen IV Advanced Modular Reactors (AMRs, expected from 2040s). AMRs use novel coolants or fuels (making them Gen IV) and might provide potential heat and/or hydrogen applications. Coolants include helium (referred to as high temperature gas-cooled reactors - HTGR), lead, molten salt and sodium. Some technologies were demonstrated in the 1960s and 70s in the UK.

The AoS considers the full lifetime of any individual nuclear generation development which might arise from EN-7 and that includes the construction, operation and decommissioning stages, as well as the safe and secure on-site storage of all spent fuel and intermediate level waste produced from operation and decommissioning until it can be sent for final disposal in a GDF. For the purposes of the AoS, the following is proposed to be considered for each type of nuclear technology addressed in the new nuclear NPS:

Nuclear Power Stations over 1GW of single reactor capacity

A period of 166 years in relation to any site which is proposed for development of a new nuclear power station over 1GW of single reactor capacity. This period is based on the following assumptions (although it is recognised that there may be some variations within this

⁴ 2 Nuclear Energy in the UK (2022) POST-PN-0687.pdf (parliament.uk):

in particular the period of interim storage of spent fuel could be significantly shorter depending on the availability of a GDF):

- Construction: up to ten years
- Operation: Approximately 60 years
- Decommissioning: Approximately 30 years
- Interim storage of spent fuel after last defueling: Approximately 100 years

Small Modular Reactors and Advanced Modular Reactors

A period of 170 years in relation to any site which is proposed for development of a new nuclear power station over 1GW of single reactor capacity. This period is based on the following assumptions (although it is recognised that there may be some variations within this in particular the period of interim storage of spent fuel could be significantly shorter depending on the availability of a GDF):

- Construction: 6 years
- Operation: Approximately 60 years
- Decommissioning: Approximately 20-30 years
- Interim storage of spent fuel after last defueling: Approximately 70 years

In relation to assessment of nuclear infrastructure, short term is considered to be up to ten years, coinciding with construction period. Medium term is considered to be 60 years, coinciding with operation and long term covers the periods of decommissioning and interim storage of waste (and its decommissioning). Long term is considered likely to be many decades – potentially up to 100 years.

It is to be noted that those technologies that are less developed, or which are due to ‘come on stream’ later in the Plan period, will consequently have a greater level of uncertainty in assessment outcome.

4: Policy context, baseline, issues and framework

4.1: 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)

4.2 Summary of PPP reviewed

The review of 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 PPP that will guide:
 - the identification of sustainability issues and opportunities pertinent to the new Nuclear NPS;
 - the development of the AoS framework to be used in the assessments of the new Nuclear NPS which will comprise Sustainability Objectives and associated Decision Aid Questions;
- The identification of planning and thematic guidance across sustainability topics which may shape NPS policy approaches as advocated by the AoS; and
- The identification of any clear early potential conflicts or challenges between the PPP and planning and thematic guidance with the emerging NPS policy which is the subject of the AoS process.

The international and national PPP that have been reviewed are listed and details of the review presented in Appendix B

INTERNATIONAL

Biodiversity

- Convention on Biological Diversity 2010.
- Kunming-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 etc.
- 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.
- Transboundary effects
- Espoo Convention on Environmental Impact Assessment in a Transboundary Context 1991.
- Public Consultation
- 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.
- 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.

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 2018.
- 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.
- UK Climate Change Risk Assessment 2022.
- The third National Adaptation Programme and the fourth strategy for climate adaptation reporting 2023.

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.

- Government Heritage Statement 2017.
- 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.
- Relevant marine plans.
- UK Marine Strategy.
- Marine strategy part one: UK updated assessment and Good Environmental Status, 2019.
- Marine Strategy Part 2, 2021.
- Marine strategy part three: 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.

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.

Transport

- Decarbonising Transport: A Better, Greener Britain 2021.

Energy

- The Energy White Paper 2020.
- The Ten Point Plan for a Green Industrial Revolution 2020.
- British Energy Security Strategy 2022.
- Nuclear Energy in the UK 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.

Radioactive Waste

- Implementing Geological Disposal – Working with communities 2018.
- Closed Consultation: Managing Radioactive Substances and Nuclear Decommissioning.

DEVOLVED ADMINISTRATIONS / LOCAL

England

Cross - thematic

- Environmental Improvement Plan (25 Year Environment Plan 2018, EIP23 and all future revisions)
- National Planning Policy Framework 2021.
- National Planning Policy Framework December 2023.
- 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 2020.
- Nature Recovery Network, Defra and Natural England 2020.
- Nature for Climate Fund.
- The Green Book, Central government guidance on appraisal and evaluation 2022.
- Introduction to the Green Infrastructure Framework - Principles and Standards for England, Natural England 2021.
- 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 2021.
- The Biodiversity Metric 4.0, Natural England 2022.
- 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.

Air Quality

- The Environmental Targets (Fine Particulate Matter) (England) Regulations 2022.

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 by The Environmental Noise (England) (Amendment) Regulations 2018.

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 and it is anticipated that EN-7 will be developed in line with these as 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.

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.
- Environment (Wales) Act 2016.
- Natural Resources Policy (Welsh Government) 2017.
- State of Natural Resources Report (SoNaRR) for Wales 2020.
- Planning Policy Wales (Edition 11, 2021).
- 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
- Welsh Government Policy on the Management and Disposal of Higher Activity Waste.

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) 2016.
- The Welsh Historic Environment Strategic Statement: Action Plan 2010.

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

- Nuclear Energy in Wales (Third Report of Session 2022-2023).
- Natural Wales Resources Technical Guidance.

Transport

- Llwybr Newydd: the Wales Transport Strategy 2021.

Scotland

Cross – thematic

- Town and Country Planning (Environmental Impact Assessment) (Scotland).
- 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.
- PAN 71 Conservation Area Management.
- PAN 60 Planning for Natural Heritage.
- PAN 1/2011 Planning and Noise.
- PAN 61 Waste Management Planning (2001).

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 2011.
- Scotland's Zero Waste Plan (2010).
- Management and Disposal of Higher Activity Waste.

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.
- Management and Disposal of Higher Activity Waste.

A series of tables contained in Appendix B 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 policies, plans and programmes should be taken into consideration in the AoS and NPS processes.

4.3 Environment Themes

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. These are listed below:

Biodiversity and the Natural Environment

- Protection of sites designated for nature conservation purposes (including candidate and potential sites).
- Protect and enhance endangered or important species and habitats, including those considered irreplaceable such as Ancient Woodland and Ancient and Veteran trees.
- 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 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, health, wellbeing and so on.
- Support ecosystem resilience.
- Contribute to addressing the problem of Invasive Non Native Species, including eradication and prevention of spread.
- Contribute to the achievement of Biodiversity Net Gain, with a minimum 10% required.
- 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.
- Contribute to the achievement of Environment Net Gain.

Geodiversity & Coastal processes

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

Greenhouse Gas 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 – with worst case scenarios being appropriate for nuclear development.

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 & Noise

- Do not cause additional AQMA to be designated.
- Reduce emissions of 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 emissions of and exposure to PM₁₀ and PM_{2.5}.
- By the end of 31st December 2040 the annual mean level of PM_{2.5} in ambient air must be equal to or less than 10 µg/m³ (in England).
- By the end of 31st December 2040, there must be a 35% reduction in population exposure to PM_{2.5} in comparison to the base year of 2018.
- Reduce effects of noise (and vibration) on people and the natural environment including underwater.

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)⁵ and the relevant River Basin Management Plan, as well as Shoreline / Estuarine Management Plans and Special Protection Zones.

⁵ 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.

- Consider how climate change may alter rainfall patterns and water availability.
- Make use of Sustainable Drainage Systems (SuDS).

Land Use, Soil and Agriculture

- Recognise finite nature of soil.

Prioritise development on brownfield sites.

- Seek to reclaim derelict and contaminated land.
- Protect farmland and soils – particularly those of the best value.
- Ensure appropriate management and storage of soils during construction.
- Change agricultural land use to forestry.

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.
- 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.
- Protect and enhance landscape and townscape character and local distinctiveness, including those areas with a sense of wildness and remoteness.
- Protect tranquillity from noise and light pollution.
- Consider how landscape planning can act in a cross cutting fashion e.g. carbon sequestration.
- Foster good design quality for all new development.

- Promote access to good quality landscapes and wellbeing infrastructures including Soundscape opportunities.
- 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 the amount of waste disposed of at landfill.
- Provide for safe and secure short term nuclear waste storage.
- 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.

4.4 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.
- Build / encourage opportunities for clusters of related industries, services and research to develop around nuclear facilities.

4.5 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 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.
- Access to Open Space and Green Infrastructure.
- Access to educational, training and employment opportunities.

5: Baseline information and key issues

5.1: Introduction

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 chapter (and Appendix C) set out baseline information for the UK (with a particular focus on England and Wales) to inform the assessment of the emerging nuclear NPS across the three sustainability dimensions: environment, social and economic. The information is an update of that used to inform the AoS of the wider suite of Energy NPSs in a completely separate exercise, with a clearer focus on the production of energy from nuclear fission.

The most efficient way to collate relevant baseline data is through the use of indicators. This ensures that the data collation is both focused and effective. The identification of relevant indicators has taken place alongside the assessment of other relevant Policies, Plans and Programmes, the identification of Sustainability Issues and development of the AoS framework.

It should be noted that the AoS process does not require the collection of primary data, instead relying on the analysis of existing information. Indicators have been selected for their ability to provide objective data that will, over time, offer an insight into general trends taking place.

The indicators that have been considered are listed in Table 5-1 below.

Table 5-1: Summary of national baseline information

Topic	Baseline Information (indicators)
Greenhouse gas emissions	Distribution of greenhouse gas emissions Contribution of sectors to greenhouse gas emissions
Biodiversity and Ecosystems	Special Protection Areas Special Areas of Conservation

Topic	Baseline Information (indicators)
	<p>Ramsar sites</p> <p>National Nature Reserves and Local Nature Reserves</p> <p>Sites of Special Scientific Interest (England, Scotland, Wales) and Areas of Special Scientific Interest (Northern Ireland)</p> <p>Marine Conservation Zones (England, Wales, Northern Ireland) – note these also align with Highly Protected Marine Areas (HPMAs)</p> <p>Nature Conservation Marine Protected Areas (Scotland)</p> <p>Ancient Woodland</p> <p>Priority Habitat</p> <p>Biosphere Reserves</p> <p>Chalk Rivers (England only)</p> <p>Biodiversity Targets</p> <p>Protected Species</p> <p>Nature Recovery Network</p> <p>Climate change adaptation risks and opportunities for biodiversity</p>
<p>Communities – Population, Employment, and Viability</p>	<p>Population</p> <p>Location of major settlements and areas of population</p> <p>Working age population</p> <p>Unemployment</p> <p>Economic Activity Rates</p>
<p>Communities – Supporting Infrastructure</p>	<p>Location of strategic rail links</p> <p>Location of strategic road network</p> <p>Location of airports</p>

Topic	Baseline Information (indicators)
	<p>Location of ports</p> <p>Gas Network</p> <p>HV Electricity Network</p> <p>Offshore Wind Farm</p> <p>Nuclear Power Stations</p>
Health and Well-Being	<p>Radioactivity levels in the environment</p> <p>The Index of Multiple Deprivation (England)</p> <p>The Scottish Index of Multiple Deprivation</p> <p>The Welsh Index of Multiple Deprivation</p> <p>Northern Ireland Multiple Deprivation Measure</p> <p>The Measuring National Well-Being Programme</p> <p>National Trails (England and Wales), Scotland’s Great Trails</p> <p>Country Parks</p> <p>National Cycle Networks</p> <p>Coastal Paths</p> <p>(See also Air Quality and Noise below)</p>
Historic Environment	<p>World Heritage Sites</p> <p>Scheduled Monuments</p> <p>Historic Battlefields</p> <p>Parks and Gardens</p> <p>Protected Wrecks</p> <p>Listed Buildings</p> <p>Conservation Areas</p>

Topic	Baseline Information (indicators)
	<p>Historic Landscape Characterisation</p> <p>Areas of Archaeological Importance</p> <p>Heritage at Risk</p> <p>Registered Historic Landscape</p> <p>Heritage Coast</p> <p>Roman Roads</p>
<p>Landscape, Townscape, and Seascape</p>	<p>National Parks</p> <p>Areas of Outstanding Natural Beauty (England, Wales, Northern Ireland) and National Scenic Areas (Scotland)</p> <p>Heritage Coasts (England and Wales)</p> <p>Landscape Character Areas</p> <p>National Character Areas (England)</p> <p>Seascape Character Areas (England and Wales)</p> <p>Green Belt</p> <p>Local Landscape Character Assessments</p> <p>Local Landscape Sensitivity Assessments</p>
<p>Air Quality and Noise</p>	<p>Air Quality Management Areas</p> <p>Noise Important Areas</p>
<p>Soils, Geology, and Land Use</p>	<p>Sites of Special Scientific Interest (England, Scotland, Wales) and Areas of Special Scientific Interest (Northern Ireland)</p> <p>National Soil Maps</p> <p>Contaminated Land</p> <p>UNESCO Global Geoparks</p> <p>Agricultural Land Classification</p>

Topic	Baseline Information (indicators)
Water Quality and Resources	Water Framework Directive (WFD) River Basin Management Plans Bathing Water Quality
Adaptation to Climate Change	Predicted changes to temperature and weather patterns Flood Risk Location of Fluvial and Tidal Floodplains & Shoreline Management Plans Marine Spatial Plans
Resources and Waste	Active Landfill Sites Mineral safeguarding and exploration zones Exploration Licenses

A series of figures have also been developed which show the geographical distribution of some of the key designations and land uses across the UK. These figures are provided in Appendix E.

Note that while these figures depict a range of key designations and land use, 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, Local Wildlife Sites, Noise Important Areas, non-designated heritage assets, listed buildings, Conservation Areas, Special Landscape Areas, Areas of Great Landscape Value, areas of contaminated land, Public Rights of Way and so on which will be considerations in any NSIP planning application.

5.2: Key sustainability issues

The SEA Regulations require the inclusion of:

'any existing environmental problems which are relevant to the plan or programme including, in particular, those relating to any areas of a particular environmental importance, such as areas

designated pursuant to Council Directive 79/409/EEC on the conservation of wild birds and the Habitats Directive’ (Schedule 2, paragraph 4).

In addition, the AoS has considered socio-economic problems to provide the full sustainability picture.

The review of PPPs (Section 4), as well as analysis of the baseline and likely evolution without EN-7 has highlighted several key issues. These, together with implications and opportunities arising for EN-7, have been summarised in the following Table 5-2. 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.

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 5-2 also shows the linkages to the AoS Objectives identified in the following chapter.

Table 5-2:

Key Issue and summary of baseline situation/information	Summary of likely evolution of the baseline without the new Nuclear NPS (direction of condition trend)	Implications and Opportunities for the new Nuclear National Policy Statement	AoS Objective (see Section 6)
<p>Biodiversity – new nuclear development and underlying climate change may put pressure on sites designated for nature conservation and wider green infrastructure, though there are also opportunities for new nuclear development to benefit wider green infrastructure and deliver Biodiversity Net Gain.</p> <p>Across England and Wales, there are sites designated internationally (SACs, SPAs, Ramsar sites) and nationally (SSSIs) for nature conservation. SACs, SPAs, Ramsar sites and SSSIs are afforded the highest level of protection through statutory designations.</p> <p>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</p>	<p>Declining</p> <p>Designated sites are afforded a high level of protection from the effects of development and face significant pressures due to and ongoing threats from practices in sectors such as industry, agriculture, transport, water supply / wastewater disposal, alongside more general pressures of increased urbanisation and the effects of climate change.</p> <p>However, while an overall general decline in biodiversity is still anticipated, it is important to note that under the</p>	<p>The NPS should aim to protect and enhance all sites of biodiversity importance in the UK and place a particular emphasis on protecting sites designated for nature conservation, as well as candidate and potential sites across marine as well as terrestrial environments. This could be achieved by ensuring that planning / design of new nuclear generation 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.</p> <p>In parallel with the AoS of the NPS, HRA is being undertaken which will identify the internationally designated nature conservation areas likely to be affected, where possible establish the likelihood of</p>	<p>Enhance biodiversity and ecological networks, deliver biodiversity net gain, protect and support ecosystem resilience and functionality</p> <p>Protect and enhance sites designated for their international importance for nature conservation purposes</p> <p>(linked to separate HRA process for new Nuclear NPS)</p>

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<p>that both Scotland and Northern Ireland also have numerous sites designated for nature conservation and there is a potential for these to be affected by proposals considered by the NPS.</p> <p>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 UK Biodiversity Action Plan (UK BAP). 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.</p>	<p>Environment Act 2021, there will be a requirement for any new planning application for development under the Town and Country Planning Act) to deliver at least 10% BNG secured for a minimum duration of 30 years from November 2023. For NSIPs, the requirement will apply later, from November 2025. BNG can be onsite or offsite and a register will be kept of this by government. The requirement for BNG also applies to brownfield sites.</p> <p>Where development would result in the loss of irreplaceable habitat then this will fall outside of the</p>	<p>impacts on the integrity of these sites and identify appropriate avoidance and mitigation measures early in the development of the NPS.</p> <p>The NPS should seek to afford protection to priority species and their habitats. A particular focus should also be placed on minimising impacts on irreplaceable habitat such as ancient woodland and ancient and veteran trees, with a presumption that these areas / features will not be subject to deterioration unless it can be shown that public benefits would outweigh the loss.</p> <p>The NPS should note the need to consider the movement of mobile / migratory species across the UK and beyond in the development of any new nuclear generation facility. Focus should also be placed on the need to prevent the introduction or spread of Non-Native Invasive Species.</p>	

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<p>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 English waters and 10 within Welsh waters. A total of 3 SPAs with marine components are located within both English and Welsh waters.</p> <p>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.</p> <p>As of June 2023, there were 68 Ramsar sites in England, totalling an area of 320,648 ha, while Wales</p>	<p>BNG calculation for the development, and it will have its own bespoke compensation agreed with the relevant planning authority for the irreplaceable area.</p> <p>It is also the intention of government to promote other activities) to help halt biodiversity loss more generally such as establishing Local Nature Recovery Strategies (as promoted by Defra) and through the 25 Year Environment Plan commitment establish a Nature Recovery Network.</p> <p>Defra has launched a consultation on Marine Net Gain in June 2023.</p>	<p>The NPS should also consider the total land area required to deliver new nuclear power. This includes the extensive construction sites, that although only temporary, have the potential to have significant permanent effects on habitats and species. There is some uncertainty as to the scale of new technologies and the potential co-location with other industry and associated infrastructure development. These may be co-dependent and with in-combination impacts. Given potential size of development, consideration must be given the potential landscape scale of impacts, and possible enhancements including those that can increase connectivity and link to Local Nature Recovery Strategies.</p> <p>The NPS should explore opportunities for new habitat creation and enhancement associated with nuclear generation developments, e.g. through the use of appropriate locally native species in</p>	

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<p>has 7 Ramsar sites, totalling 11,366ha.</p> <p>In addition to these internationally designated sites, there are over 4000 SSSIs within England and over 1000 in Wales. There are also 89 Marine Conservation Zones (MCZ) designated in England, with 1 MCZ 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 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</p>	<p>seeking views on the proposed aims and principles of marine net gain and how to best introduce a net gain approach to infrastructure and development in the marine environment There are provisions in the Environment Act 2021 to allow marine net gain to be made mandatory in the future.</p>	<p>landscaping plans and the delivery of BNG. The potential for biodiversity creation in brownfield sites should be also taken into account. There should therefore be achievement of BNG, recognising that a minimum target of 10% is required as part of the Environment Act 2021. For statutory protected areas and their features, BNG should be additional to any existing legal and policy requirements applying to such designated sites, recognising that this is a habitats based tool and other protection and enhancement measures will be needed for species.</p> <p>The NPS should also set out the need for development of new nuclear generation facilities to consider and seek to provide improvements to natural capital and ecosystem services (i.e. achievement of wider environmental net gain) in a wider context than BNG and be a consideration</p>	

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<p>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).</p> <p>There are substantial numbers of National Nature Reserves (NNR) and Local Nature Reserves (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.</p> <p>All sites, from those designated with the very highest level of protection, to those areas at the local level, are</p>		<p>for choosing and identifying effects on proposed sites.</p> <p>Other opportunities for the NPS include the following:</p> <ul style="list-style-type: none"> • integration and enhancement of the wider green infrastructure network contributing to the Nature Recovery Network; • creation of cohesive habitat networks to help habitats and species adapt to the consequences of climate change; • enhance biodiversity taking full account of its ability to store or sequester carbon; • restore biodiversity following construction and decommissioning of nuclear plants; and • increased accessibility to appropriately designed multi-functional green infrastructure can 	

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<p>threatened by a wide range of issues such as habitat loss, human encroachment, poor management practices and invasive species. Changes in air and water 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.</p> <p>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</p>		<p>play a significant role in diverting pressure away from more sensitive sites or areas.</p> <p>The NPS should ensure that the locations of cooling systems intake and outfall are sited to avoid or minimise adverse impacts on the receiving waters, including 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. The NPS should also note the potential implications of dredging in the freshwater, estuarine or marine environment, as well as the requirement for licensing and liaison with bodies such as the Marine Management Organisation.</p>	

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<p>susceptible to impacts from development including:</p> <ul style="list-style-type: none"> • direct land take (which may contribute to fragmentation) • construction and operational disturbance (noise, vibration, light pollution, etc.) • emissions / contamination (air, water and soil) <p>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 for nuclear development, particularly during construction and in delivering related infrastructure.</p>			

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<p>In the marine environment, birds, mammals, fish, pelagic habitats and benthic habitats are affected by impacts such as:</p> <ul style="list-style-type: none"> • 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 			

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<p>extraction of seabed substrate).</p> <p>In recognition of the continued threats and alarming levels of biodiversity decline, there are a range of commitments made 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 the UK, 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</p>			

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<p>currently in development by Defra who will provide further guidance in due course.</p> <p>Three statutory long-term targets have been set in 2022:</p> <ul style="list-style-type: none"> • 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. 			

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<p>Geodiversity - new nuclear development may put pressure on designated geodiversity sites</p> <p>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.</p> <p>There are also a range of Regionally Important Geology Sites (RIGS) and Local Geological Sites across England and Wales.</p> <p>Geology across England and Wales faces multiple threats from human</p>	<p>Declining</p> <p>While some of the geodiversity resource is in favourable condition, some is not and all aspects are experiencing threats from development e.g. due to general increasing urbanisation and need for infrastructure, as well as the need to adapt to climate change.</p> <p>In the absence of the NPS, there is heightened potential for inappropriate greenfield development, though some protection is afforded to important areas of geodiversity such as those designated as SSSI and RIGS.</p>	<p>A co-ordinated strategic approach to the development of new infrastructure is required to limit the potential for inappropriate development on geodiversity sites to occur. Inappropriate development could also lead to changes in shoreline dynamics / coastal processes which may pose an indirect risk to sites of geodiversity importance on the shoreline and in marine waters.</p> <p>The NPS presents an opportunity to develop strategic principles designed to avoid geodiversity sites and manage the shoreline, 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.</p> <p>The NPS could also potentially encourage greater access to sites of geodiversity interest on land.</p>	<p>Protect, enhance and promote geodiversity</p>

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<p>activities such as new development, pollution, roads, disturbance, farming practices; changes to shoreline management, loss of habitat; and a changing climate.</p>			
<p>Greenhouse gas emissions – there is an urgent need to further reduce GHG emissions from the energy sector</p> <p>The release into the atmosphere of greenhouse gases e.g. carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O) and F-gases) resulting from fossil fuel usage, agriculture, land use change and other human activities has been linked with atmospheric warming and global climate change.</p> <p>As of 2021, UK total net GHG emissions equalled 426.51 million tonnes of CO₂ equivalent</p>	<p>Declining</p> <p>Interventions at the local, regional and country level to increase the production of renewable energy have started to reduce the rate of GHG emissions associated with the energy sector; and such actions outside the NPS are contributing to decarbonisation of energy networks.</p> <p>However, the underlying trend points towards a</p>	<p>The NPS should ensure that reducing CO₂ and other GHG emissions and achieving Net Zero is a core target during the lifetime of any nuclear development. Construction, operation and decommissioning of new nuclear generation power stations should be Net Zero through minimising carbon emissions to the atmosphere and the use of carbon dioxide removals solutions employed, both technological and nature-based, for any residual emissions.</p> <p>The NPS must ensure that opportunities are taken for coordination of nuclear energy development locations with other sustainable infrastructure location, such as long distance transmission lines.</p>	<p>Consistent with the national target of reducing carbon emissions to Net Zero by 2050</p>

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<p>(MtCO₂e). This figure reflects significant cuts to emissions in recent years. Total emissions of direct greenhouse gases (GHG) have decreased by 43.8% between 1990 and 2019 and 2.8% between 2018 and 2019. This decline between 1990 and 2019 is driven predominantly by a decrease in emissions from the energy supply sector – particularly from power stations due to less reliance on coal and greater efficiencies in fuel use e.g. to heat buildings. 2020 saw a further decline of 9.5% compared to the 2019 figure, 49.7% lower than they were in 1990. The coronavirus (COVID-19) pandemic and the resulting restrictions introduced in 2020 across the UK had major impacts on various aspects of society and the economy, which led</p>	<p>slowing of emissions rather than reversal of trends.</p>	<p>The NPS should ensure that consideration is given to carbon storage in the site selection, for instance by avoiding construction where it would cause the degradation of peat or where it would cause the removal of tree cover.</p> <p>The NPS should also ensure that opportunities are taken for maximising tree cover and peatland restoration as part of nuclear development. 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 of peatland in unfavourable condition will allow the preservation a large carbon stock and avoid its release to the atmosphere (note this is further considered under the Biodiversity issue).</p>	

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<p>to a significant decrease in GHG emissions.</p> <p>In 2021 there was an increase of 5% from the 2020 figure, but still 5.3% lower than in 2019, the most recent pre-pandemic year.</p> <p>Provisional figures for 2022 show that despite rises in some emissions as the UK continued to recover from the COVID-19 pandemic, 2022 saw another fall in GHG emissions, largely due to a reduction in fuel use to heat buildings. This will largely be because 2022 was considerably warmer than 2021 and higher energy prices may also have been a factor, particularly towards the end of the year. Total GHG emissions are estimated to have decreased by 2.2% compared to 2021. Compared to 2019, the most recent pre-pandemic year, 2022 CO2</p>			

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<p>emissions are down 7.5% and total GHG emissions are down 7.4%. Total GHG emissions were 48.7% lower than they were in 1990.</p> <p>CO2 is the largest contributor to global warming in the UK, of which the largest sources are power generation and road transport. Emissions have reduced from 1990 due to fuel switching, structural change, and improvements in end-use efficiency. The second most important source of greenhouse gases is methane (CH4). Annual emissions of CH4 have reduced by over half since 1990. The main sources of CH4 are agriculture, waste disposal, leakage from the gas distribution system and coal mining. Reductions in CH4 emissions in the UK are driven by the increased utilisation of methane from landfills, a large decline in UK</p>			

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<p>coal mining, investment in improvements to the natural gas supply infrastructure to reduce leakage and a reduction in livestock numbers. Emissions of nitrous oxide have also reduced by over half since 1990. Most N2O emissions are generated from the agriculture sector which have decreased primarily due to reduced emissions from synthetic fertiliser application. The smallest percentage reduction in emissions across the time series is for the F gases: HFCs, PFCs, NF3 and SF6. F-gas emissions have decreased since 1995, due mainly to the fall in F gas manufacture in the UK and the installation of abatement equipment at two of the three UK manufacturers. These emission reductions have been to some extent offset by the increases in the use of HFCs as substitutes for</p>			

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<p>ozone depleting substances, particularly in refrigeration and air conditioning.</p> <p>Heightened efforts by government to address climate change resulted in commitments (made in December 2020 under the UK’s Nationally Determined Contribution communication to the UNFCCC6) to reducing economy-wide GHG emissions by at least 68% by 2030, compared to 1990 levels and the amendment to the Climate Change Act in 2019 to bring all GHG emissions to Net Zero (100 % reduction compared to 1990 levels) by 2050.</p> <p>Under the UK Climate Change Act 2008, the UK has so far set six ‘carbon budgets’. These set interim</p>			

⁶ UNFCCC is the United Nations Framework Convention on Climate Change

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<p>five-year caps on emissions from 2008 to 2037. The UK is currently in the fourth budget period (2023 to 2027). The first (2008-12), second (2013-17) and third (2018-22) carbon budget have been met by the UK. However, it is not on track to meet the fourth (2023-27) or the fifth (2028-32) which require a 50% and 57% reduction in emissions below the base year.</p> <p>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</p>			

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<p>carbon power in buildings, industry, transport, and agriculture.</p> <p>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.</p> <p>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</p>			

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<p>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.</p>			
<p>Adaptation to a changing climate – Climate change adaptation aims to increase society and nature’s resilience to climate change. The UK is 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</p>	<p>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</p>	<p>The NPSs needs to recognise that changes in temperature and rainfall patterns, along with more frequent extreme weather events (for example leading to drought or flood), create the situation where a greater degree of resilience will have to be incorporated into nuclear energy infrastructure.</p>	<p>Maximise adaptation and resilience of built assets, communities and people as well as natural assets, habitats and species, to the</p>

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<p>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 nuclear development to be climate change resilient.</p> <p>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 and there is an urgent need to develop climate resilience.</p> <p>Along with an increase in extreme weather events, it is anticipated that a changing climate will lead to an increase in risk to people and place, including risks to health and well-</p>	<p>winters; and rising sea levels. These trends are anticipated to continue, and potentially exacerbate, irrespective of interventions from outside the NPS.</p>	<p>The NPS should recognise the challenges that a changing climate will bring and aim to reduce the impacts. More frequent and extreme weather events leading to flooding as well as issues such as temperature increase, sea level rise and coastal change and erosion that result from climate change should be considered in any nuclear energy infrastructure design using the UK Climate Projections 2018 (UKCP18). UKCP18 provide projected changes in the UK climate at a national and regional level and are available for different GHG scenarios and for different times periods showing the spread of possible climatic outcomes based on different probability levels.</p> <p>The NPS should address the risks to people and the economy from climate-related failure of the nuclear energy infrastructure.</p>	<p>multiple effects of climate change</p> <p>Enhance biodiversity and ecological networks, deliver biodiversity net gain, protect and support ecosystem resilience and functionality</p> <p>Improve health and well-being and safety for all citizens and reduce inequalities in health</p>

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<p>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; and risks to people and the economy from climate-related failure of the power system.</p> <p>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</p>		<p>Flood risk and coastal change can have significant impacts on species and sites and should be considered in any design. The NPS should seek to ensure that new energy infrastructure development minimises any negative effects arising from flooding and avoids where possible areas of highest flood risk. This is due to potential location of nuclear sites near the coast, many areas will be a risk of sea level rise and coastal erosion associated with climate change.</p> <p>The implementation of multi-functional green-blue infrastructure including SuDS and other similar appropriate measures or new approaches should be considered and encouraged in the designs, where feasible to reduce impacts. This should include Natural Flood Management and other means of increasing flood storage capacity.</p>	

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<p>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, or severe cold spells.</p> <p>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.</p> <p>A changing climate also presents risks to the natural environment and</p>		<p>The NPS should recognise the potential, given the size of nuclear power development and mitigation / enhancement requirements to deliver nature-based projects, such as tree planting and peatland restoration, at a landscape scale that seek help in adapting to climate change through delivering urban cooling, wildlife benefits, contributing to flood reduction and supporting carbon sequestration.</p> <p>The NPS should address the risks to the viability and diversity of terrestrial, freshwater and marine habitats and species from multiple climate hazards in nuclear development design. Coastal habitats that may be further impacted by coastal and flood defences relating to nuclear infrastructure, with additional coastal squeeze (note that this is further considered under the Biodiversity issue.</p>	

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<p>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 loss or degradation of peatland due to extreme drought</p> <p>Soil health is affected from increased flooding and drought which compromises soil functions (note that this is further considered under the Soil topic).</p>		<p>The NPS should address the risks to natural carbon stores and sequestration from multiple climate hazards which lead to increased emissions (note that this is further considered under the Biodiversity issue).</p> <p>The NPS should address risks to soil health from increased flooding and drought (note that this is further considered under the Soil issue).</p> <p>Recognition also needs to be made of health implications from a changing climate (note that this is further considered under the Communities issue) .</p>	

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<p>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</p> <p>Air pollution affects public health, the natural environment and the economy.</p> <p>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</p>	<p>Improving</p> <p>At the national level air quality is generally improving as industrial practices, energy sources and tighter environmental legislation have contributed to reductions in pollutants.</p> <p>Increased uptake of electric vehicles is also anticipated to further reduce concentrations of pollutants.</p> <p>However, parts of England and Wales (typically within urban areas) still experience localised pockets of poor air quality due to motor vehicles– interventions outside the</p>	<p>The NPS should aim to protect and enhance air quality and should seek to reduce NO₂, PM_{2.5} and PM₁₀ emissions to within statutory limits now and in the future.</p> <p>The NPS should aim to ensure that no Air Quality Management Area (AQMA) is worsened or proposed new nuclear generation development does not lead to new AQMA, particularly due to increases in road traffic / transport associated with the construction, operation and decommissioning of nuclear power stations, noting that emissions during operation would likely be relatively low and only associated with ancillary activities, not the main generation of power.</p> <p>The NPS needs to recognise that as construction and decommissioning of large nuclear power stations last many years, the potential irreversible adverse effects of a long period of reduced air quality must</p>	<p>Protect and enhance air quality on local, regional, national and international scale</p> <p>Improve health and well-being and safety for all citizens and reduce inequalities in health</p> <p>Enhance biodiversity and ecological networks, deliver biodiversity net gain, protect and support ecosystem resilience and functionality</p>

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<p>biodiversity, 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 a major contributor to poor air quality in towns, particularly during winter months.</p> <p>The association of poor air quality with urban/industrial areas and major road infrastructure 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. Scotland and Northern Ireland also</p>	<p>NPS such as the ban on petrol and diesel cars by 2035 will address most of these issues over time. This though will also place an increased demand on the electricity supply network.</p>	<p>be recognised when considering suitable sites and potential effects, in particular where they may be co-located with other air polluting development and associated infrastructure.</p> <p>The NPS should aim to comply with future more strict government targets for air quality, particularly seeking to deliver health benefits from improved air quality, as well as considering ecological receptors.</p> <p>The NPS should encourage the development or enhancement of green infrastructure, which can help to reduce pollutant distribution and improve air quality in a local context.</p>	

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<p>have extensive areas designated as AQMA, again mainly relating to the road network.</p> <p>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 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.</p>			

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<p>The Environment Act 2021 stipulates air quality (PM2.5) as priority quality long term target.</p>			
<p>Water environment –pollutant discharges from a range of sectors including energy pose considerable risks to the quality of water across the UK. Additional water demand from new nuclear development alongside additional demand from other sectors would likely put further pressure on water resources.</p> <p>There are considerable pressures on water resources (terrestrial and marine) with resulting major impacts on many of the waterbodies across the UK, both in terms of quantity and quality. For the purposes of taking a holistic approach to management of water resources and to address the pressures on the</p>	<p>Stable / Declining</p> <p>Surface water quality is predicted to remain stable; marine water quality contaminant concentrations are generally stable or improving, However, ongoing pressures such as a growing population, intensive agricultural production, industrial growth, increasing urbanisation (alongside discharge of wastewater) and a growing transport network, alongside a legacy of underinvestment</p>	<p>Nuclear energy infrastructure development will likely be typically located in rural and coastal areas on land which have a strong relationship with ground, surface, estuarine and coastal water bodies. As such, the NPS should seek to prevent pollution of water bodies (including groundwater, inland surface water, transitional waters, coastal and marine waters) during construction, operation and decommissioning of any proposed new nuclear generation development.</p> <p>During construction, protection of the water environment could be achieved via the appropriate use of Sustainable Drainage Systems (SuDS), green infrastructure or other appropriate measures and new approaches in infrastructure drainage</p>	<p>Protect and enhance the water environment</p> <p>Enhance biodiversity and ecological networks, deliver biodiversity net gain, protect and support ecosystem resilience and functionality</p>

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<p>water environment, under the Water Framework Directive (WFD), the UK has been divided into a series of River Basin Districts (RBD).</p> <p>As with most water bodies in England, there is 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 contamination⁷</p> <p>There are also a series of Drinking Water Safeguard Zones (DWSZ) across England and Wales, as well groundwater Source Protection Zones (SPZ) and designated bathing waters.</p>	<p>in infrastructure remain and climate change may further compromise the ability to make improvements.</p>	<p>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 and careful management of construction activities (such as extensive topsoil stripping) made. Consideration should also be made of how the water environment might change due to impact of climate change on rainfall patterns and water availability.</p> <p>Physical modifications should be considered for waterbodies (riverbanks, shorelines, seabed etc.) for the construction of new nuclear facilities. Specific protection measures for groundwater are also likely in relation to new nuclear generation.</p> <p>Nuclear generation of energy has typically involved the requirement for large</p>	

⁷ House of Commons Environmental Audit Committee – Water Quality in Rivers Fourth Report of Session 2021-22

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<p>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 further increase pressure on freshwater water resources.</p> <p>There is also a network of Marine Protected Areas (which compliment and are aligned to wider</p>		<p>quantities of water to be abstracted for cooling purposes and this water also needs to be discharged back to the environment. The NPS should seek to protect marine receiving waters from the impacts of any discharges, recognising the stringent controls enforced by the UK’s regulatory regime. The NPS should also note the potential implications of dredging in the freshwater, estuarine or marine environment, as well as the requirement for licensing and liaison with bodies such as the Marine Management Organisation.</p> <p>Adoption of the objectives and approaches set out in Water Resource Management Plans, Shoreline / Estuarine Management Plans, WFD and Marine Strategy Regulations should be made and all opportunities to help meet the objectives of these should be taken when possible. Approaches specific to the marine environment set out in Marine Plans and in relation to designated areas such as</p>	

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<p>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).</p> <p>The Marine Strategy Regulations 2010 marked a significant step</p>		<p>Marine Protected Areas should also be adhered to.</p> <p>The siting of nuclear facilities in clusters due to the NPS could have significant effects on the water environment in local areas, although the nature of these impacts will depend on the technology type, the number of reactors deployed and the precise location of the development.</p>	

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<p>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.</p>			

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<p>Soil and Contaminated Land – soil is a non-renewable resource and is vulnerable to erosion, degradation, contamination, as well as soil sealing. Historic land uses have contributed to contamination across large areas. There is a need to address contamination to enable beneficial re-use of previously developed land and protect soil resources from pressure for greenfield development</p> <p>Soil across England and Wales is graded, with those areas considered Best and Most Versatile (BMV) being noted as Grade 1, 2 and 3a. BMV soils are under pressure in many areas from new development.</p> <p>Soil sealing (the covering of the soil surface with impervious material or the changing of its nature so that it becomes impermeable) is</p>	<p>Declining</p> <p>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 (including areas of BMV) and fail to realise the potential of existing development capacity within existing urban and previously developed areas.</p> <p>Changing weather patterns due to climate change will also have implications for soil health, as well as its</p>	<p>The NPS must protect soils as far as practicable as they are essential natural capital and perform a range of important ecosystem services and functions.</p> <p>The NPS should recognise that soils are essentially finite and declining in extent and 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 in such areas. Nuclear development on areas of the highest quality agricultural soils should be avoided where possible and soil and agricultural holdings protected through avoidance of impacts such as contamination or severance.</p> <p>Dealing with the past pollution / contamination legacy is a major issue and should be addressed at all opportunities due to its ongoing environmental impact.</p>	<p>Protect soil resources, promote use of brownfield land and avoid land contamination</p>

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<p>associated with development and is a primary cause of soil loss and development of greenfield sites can also lead to loss to valuable agricultural land (where such land exists) which generally cannot be mitigated.</p> <p>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, with potentially contaminated sites contaminated by a wide range of harmful substances such as oils and tars, heavy metals, asbestos and chemicals.</p> <p>While many special sites of contamination have been identified, by its nature, it is often very difficult to know where land has been contaminated previously or is</p>	<p>ability to produce food, help protect against flooding etc.</p> <p>Note that while it is considered that the soil resource is declining for the reasons outlined, Natural England have commissioned a research project to investigate the amount of land take occurring on agricultural land which has occurred since the last review, utilising the Provisional ALC; BMV likelihood; and Post -1988 ALC mapping.</p>	<p>Minimising impacts on soil health and addressing the need for topsoil stripping, topsoil storage and effects on soil moisture across sites of significant size should also be key considerations for the NPS. Reference to Defra Construction Code should be made with regards to sustainable soil management (Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (publishing.service.gov.uk)). Clustering of nuclear facilities could have cumulative implications for soil resource in a local area.</p>	

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<p>currently suffering ongoing contamination. Contamination can spread considerable distances from its original source. 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.</p>			
<p>Historic Environment – there is a substantial cultural heritage resource across the UK and in its surrounding seas; however, there is considerable variation in the condition and integrity of assets.</p>	<p>Stable/Declining Designated heritage assets benefit from protection that will continue without the NPS.</p>	<p>Additional energy related development may be inappropriately located or designed and therefore pose a risk to the cultural heritage assets as well as their settings. Without a co-ordinated strategic approach to development and infrastructure there is</p>	<p>Protect and enhance cultural heritage assets and their settings, and the</p>

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<p>There is a need for a strategic perspective that promotes contextual understanding and supports regeneration where this contributes to conservation and enhancement</p> <p>The cultural heritage assets of the greatest recognition across England and Wales are the 22 World Heritage Sites. These sites received this designation due to their globally important cultural or natural interest. Their management plans note that this is to be understood, protected and sustained.</p> <p>In addition, there are approximately 24,000 Scheduled Monuments across England and Wales, that are considered to have nationally important cultural heritage features. A large number these sites are at particular risk of being lost through</p>		<p>an increased potential for such risks 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.</p> <p>New nuclear energy related development may result in pressure on areas of importance for their cultural heritage and aesthetic quality. Development proposals must carefully consider such that impacts on heritage assets and their settings are minimised. The NPS should 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.</p>	<p>wider historic environment</p> <p>Protect and enhance the character and quality of the landscapes, townscapes and waterscapes and protect and enhance visual amenity</p>

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<p>neglect, decay or deterioration. It is also worth noting that some historic assets are in the marine environment – for example there are 57 protected wreck sites in English waters.</p> <p>Similarly, many of the approximately 430,000 listed buildings and 10,500 Conservation Areas across the UK are at risk due to increasing pressure from development, neglect, decay or deterioration.</p> <p>In addition, Areas of Ancient Woodland, i.e. those areas that have been continuously wooded since at least 1600AD are scattered across the United Kingdom. These areas have a significant contribution to the cultural heritage of an area and are also of importance to biodiversity and landscape.</p>		<p>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. Such features could be affected directly by mechanical action or indirectly e.g. through dewatering for construction and this means consideration would be required of potential changes in groundwater levels, flows and chemistry on preserved organic and palaeoenvironmental remains. As such the NPS should recognise there may be a requirement for detailed and extensive assessment work such as Heritage Impact Assessment of any proposed sites for development.</p> <p>It is also the case that the historic environment can be impacted by construction on the foreshore or seabed and this should also be recognised.</p> <p>As such, any energy related development should be as sensitively designed as</p>	

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<p>Beyond these assets, there are also a large number of registered parks and gardens across the UK which are of historic importance, as well as a number of undesignated assets or unknown archaeological remains which could have national, regional or local value.</p> <p>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 (which are essentially finite and irreplaceable) 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.</p>		<p>possible to recognise and be sympathetic to the existing cultural character and quality and opportunities for improving settings should be examined. Opportunities for improving access, understanding or enjoyment of the historic environment and heritage assets as part of the design and implementation of any new nuclear generation development should also be taken where possible.</p>	

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<p>Landscapes, Waterscapes & Townscapes – there are marked contrasts in the quality, character and distinctiveness of landscapes and townscapes across the UK. There is a need to fully protect the highest quality locations, whilst driving best practice principles through all nuclear power developments to protect valuable scape environments.</p> <p>There are 13 National Parks and 38 AONBs within England and Wales, as well as 46 Heritage Coasts. As of November 2023, AONB has been renamed to National Landscapes in England and Wales.</p> <p>Scotland has 2 National Parks and 40 National Scenic Areas.</p> <p>Landscape characteristics are assessed across the UK through</p>	<p>Stable</p> <p>Many of the most exceptional landscape and townscapes 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.</p>	<p>The NPS should seek to preserve, conserve and enhance the character of the wider landscape and waterscape by ensuring that its integrity and valuable natural open space is not lost. Particular attention to be paid to those areas designated or recognised for their landscape value, such as AONBs, Heritage Coasts and National Parks. Consideration should also be made within the NPS of the need to protect those areas noted for landscape value at a local scale.</p> <p>The NPS should recognise the difficulty of achieving landscape protection due to the nature, size and land-take required for large nuclear facilities and recognise that particular areas which may be attractive for nuclear generation e.g. coastal or rural areas, may also have significant high-quality landscape and seascape attributes.</p> <p>Opportunities for landscape enhancement should be explored, e.g. through</p>	<p>Protect and enhance the character and quality of the landscapes, townscapes and waterscapes and protect and enhance visual amenity</p>

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<p>several methods, including sub-division of England into Landscape Character Areas and use of the LANDMAP tool in Wales.</p> <p>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 setting and special character of historic towns and assists in urban regeneration, by encouraging the recycling of derelict and other urban land”⁸.</p>		<p>sympathetic design, enhancements to existing landscape areas and characteristics, such as considering new planting or habitat recreation opportunities in keeping with the aims of the Nature Recovery Network (see Biodiversity issue).</p> <p>Increased development linked to new nuclear generation may pose a risk to tranquillity through increased disturbance (including light and noise). There is therefore a need to protect the special quality of those areas of relative tranquillity which can be experienced in many parts of England and Wales, including those with a sense of wildness and remoteness. Without a strategic approach to new nuclear development and infrastructure, degradation of the special qualities of the most special areas such as National Parks and AONBs may result.</p>	

⁸ National Planning Policy Framework (2021), Paragraphs 137 to 138

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<p>While there are areas of great natural 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 and loss of tranquillity and dark skies is a growing concern.</p> <p>Nevertheless, across the UK there are 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-</p>		<p>As such, the NPS should aim to ensure that nuclear energy developments and associated infrastructure consider relevant effects from the very earliest stages of planning, avoiding sensitive areas where possible and respecting particular landscape, waterscape or townscape settings.</p> <p>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 valued sense of place. Design, where possible, should respond positively to the local characteristics, including vernacular architecture when appropriate. Effective landscape planning which should be encouraged by the NPS also provides opportunities for other issues such as the need to enhance biodiversity and achieve BNG, enhance the Nature Recovery Network, enhance access to</p>	

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<p>functional way across a range of issues by supporting, for example, biodiversity, carbon storage, natural drainage and flood storage and health and wellbeing. The contribution the sea makes to this resource is also significant. Increased urbanisation and general development has acted to erode the connectivity of this green and blue infrastructure, resulting in a decrease in its integrity.</p> <p>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</p>		<p>natural greenspace and deliver wider environmental gains.</p>	

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<p>have introduced a juxtaposition of modern architecture with historic fabric, delivering distinctiveness within the townscape.</p> <p>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.</p>			
<p>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.</p>	<p>Declining</p> <p>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</p>	<p>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.</p> <p>The NPS can also help reduce the consumption of fuel by helping to provide electricity output to help facilitate a shift to</p>	<p>Promote sustainable use of resources and natural assets</p>

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<p>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).</p> <p>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.</p> <p>Total UK commercial and industrial waste, comprising inert, non-hazardous arising which result from trade or businesses, was 36.1 million tonnes in 2018⁹. Around 80% of this total was generated in</p>	<p>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. Clearly with further development of nuclear power generation, it can be expected that the level of waste arising in all categories of nuclear waste will rise.</p>	<p>more sustainable forms of transport such as Low and Zero Emission Vehicles.</p> <p>The NPS should address the issue of nuclear waste generated by new nuclear power stations through emphasising government's commitment to the safe and sustainable management of radioactive waste. Developers should be required to demonstrate that they have considered and accounted for the long-term management of nuclear waste and spent fuel including storage, transportation, and disposal methods.</p> <p>The NPS should recognise the government's policy that higher activity waste and spent fuel (for which no further use is envisaged) should be disposed of in a Geological Disposal Facility (GDF) and state that new nuclear power stations should make provision for the eventual</p>	

⁹ Last available figures – these figures are under review by Defra.

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<p>England. This was split between the commercial and industrial sectors by 27.5 and 13.6 million tonnes respectively.</p> <p>New nuclear 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.</p>		<p>disposal of their radioactive waste and spent fuel in a GDF. Developers should be required to engage with the government's GDF programme and ensure that their waste management plans align with the future availability of a GDF.</p>	

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<p>Within the UK, radioactive wastes are classified according to the type and quantity of radioactivity they contain and how much heat is produced. Waste is categorised as High Level, Intermediate Level and Low Level, with how the waste is managed dependent on its category.</p> <p>Note that issues relating to the disposal of nuclear waste in a long term disposal facility will not be addressed via this NPS.</p> <p>Nevertheless, it is important to note that Developing a Geological Disposal Facility (GDF) for the permanent disposal of higher activity radioactive wastes is a strategic imperative of government.</p> <p>Since the 2011 nuclear siting NPS the following are the key</p>			

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<p>developments in nuclear waste management:</p> <p>a new process to identify a suitable location for a GDF was launched in England in 2018 and in Wales in 2019. Both are consent-based processes that requires the developer, Nuclear Waste Services, to work in partnership with communities that enter the process;</p> <p>four communities are engaged in the process and some early geological investigations have taken place in some areas;</p> <p>the UK Government has legislated in the Energy Act 2023 for a more proportionate regulatory framework at the end stages of decommissioning when hazards and risks are low;</p>			

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<p>The UK Government and devolved administrations published a consultation in March 2023 to update policies on managing radioactive substances and nuclear decommissioning. This includes proposals to allow the disposal of intermediate level waste in near surface disposal facilities. The UK Government and devolved administrations expect to publish the final policy early in 2024.</p>			
<p>Economic activity, opportunity and deprivation – there are marked spatial contrasts in economic activity rates across the UK and the challenge is to achieve more equitable access to opportunity as a means of tackling deprivation.</p> <p>The economy across the UK has been subject to challenging</p>	<p>Uncertain</p> <p>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</p>	<p>Businesses and jobs rely on the use of energy, with economic output and associated jobs dependent on a robust, reliable and affordable energy system.</p> <p>In addition, it is anticipated that the construction, operation and decommissioning of nuclear energy infrastructure can be expected to have</p>	<p>To promote a strong economy with opportunities for local communities</p>

Key Issue and summary of baseline situation/information	Summary of likely evolution of the baseline without the new Nuclear NPS (direction of condition trend)	Implications and Opportunities for the new Nuclear National Policy Statement	AoS Objective (see Section 6)
<p>conditions since 2020 due to a complex interaction of impacts from Covid-19 and other external factors such as the war in Ukraine, subsequent energy cost increases and a ‘cost of living’ crises. Since the Covid-19 pandemic, unemployment rates have begun to increase. As of March 2023, the unemployment rate in England was 3.8% and in Wales 4.8%. However, there is still some uncertainty on how unemployment will be affected in the long-term.</p> <p>As of March 2023, economic activity rates were 79.6% in England and 75.6% in Wales. Economic activity rates have not varied significantly in the UK since 1992.</p> <p>Gross domestic product (GDP) has been estimated to have increased by 0.1% in the first quarter of 2023,</p>	<p>can be a proxy for the quality of job opportunities available.</p> <p>It is also recognised through the governments ‘levelling up’ agenda that not everyone in the UK shares equally – it is government policy to ensure that everyone is given an opportunity to avail of opportunities, with the aim that people live longer, more fulfilled lives, benefiting from sustained rises in living standards and well-being.</p> <p>Nevertheless, it will remain challenging to ‘level up’ the whole country. In addition, the impact of Covid-19, the war in Ukraine and</p>	<p>positive socio-economic effects at local and regional levels.</p> <p>The pattern of deprivation across England and Wales is geographically complex, incorporating stark contrasts between wealthy and severely deprived communities.</p> <p>The NPS also provides opportunities to increase training and apprenticeships in local areas, as well as encouraging / strengthening local supply chains. Similarly, the highly specialised and technical nature of nuclear energy means that the NPS provides opportunities to encourage development of ‘clusters’ of related industries and services, research and development and so on.</p>	

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<p>this follows a 0.1% increase in the previous quarter too. The level of quarterly GDP in the first quarter of 2023 is now 0.5% below the pre-pandemic level (taken as Quarter 4 of 2019)¹⁰.</p> <p>These issues will undoubtedly play a major role in deprivation and economic outcomes across the UK, 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.</p> <p>The south east, south west and east of England are the least deprived areas in the UK, though these</p>	<p>other global economic ‘head winds’ such as persistent high inflation on these trends remains uncertain. It is considered that while the UK may avoid falling into recession, overall growth in the economy, at least in the short term of 2023-2024, will be low.</p>		

¹⁰ Office for National Statistics (2023) *GDP quarterly national accounts, UK: January to March 2023*. Available: <https://www.ons.gov.uk/economy/grossdomesticproductgdp/bulletins/quarterlynationalaccounts/januarytomarch2023>

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<p>regions also have significant areas of high deprivation and the ‘cost of living’ can be particularly challenging. Deprivation increases in urban areas, with towns and cities generally being more deprived than rural areas, though the nature of the rural economy and society can mask pockets of high deprivation. Coastal communities can also often feel ‘forgotten’ or neglected. 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.</p> <p>The south east and north east coast are the most deprived areas in Wales. Deprivation is most concentrated in the south east,</p>			

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<p>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, though again, pockets of deep deprivation exist.</p> <p>These areas of deprivation 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 the UK.</p>			

Key Issue and summary of baseline situation/information	Summary of likely evolution of the baseline without the new Nuclear NPS (direction of condition trend)	Implications and Opportunities for the new Nuclear National Policy Statement	AoS Objective (see Section 6)
<p>Population growth and demographics – the UK has 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.</p> <p>The population of England in mid-2019 was 56,536,419 which accounts for 84% of the UK’s population. The population of Wales in mid-2019 was 3,105,410 which accounts for 5% of the UK’s population. The UK population growth is anticipated being greatest in England (6.5%) and lowest in Wales (1.4%). The highest regional growth rate in households is projected to take place in the South</p>	<p>Increasing</p> <p>Population growth is projected to continue to increase across the UK and the overall trend is towards an ageing population.</p>	<p>Both England and Wales (along with the UK as a whole) are expected to see population growth in the coming years, with a growth in the proportion of residents of an older age. In England as a whole, the older population is projected to increase from 18.2% to 20.7% of the total population between mid-2018 and mid-2028.</p> <p>This general population 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 implications of COVID-19 are still unclear in this regard.</p>	<p>Improve health and well-being and safety for all citizens and reduce inequalities in health</p>

<p>Key Issue and summary of baseline situation/information</p>	<p>Summary of likely evolution of the baseline without the new Nuclear NPS (direction of condition trend)</p>	<p>Implications and Opportunities for the new Nuclear National Policy Statement</p>	<p>AoS Objective (see Section 6)</p>
<p>West, while the North East is projected to have the slowest rate, with the northern regions of England as a whole projected to grow at a slower rate than all other regions in England over the next 10 years.</p> <p>Local authorities with the highest proportions of older people in the UK are most commonly found in coastal areas of southern and eastern England.</p> <p>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 50 people per square kilometre in the most rural local authorities of the UK.</p> <p>The south east of England, in particular London and the surrounding areas are highly</p>		<p>To ensure that there is sufficient electricity to meet demand, new electricity infrastructure will have to be built to replace output from retiring plants and to ensure the United Kingdom can meet increased demand. Government analysis suggests that even with major improvements in overall energy efficiency, and increased flexibility in the energy system, demand for electricity is likely to increase significantly over the coming years and could more than double by 2050 as large parts of transport, heating and industry decarbonise by switching from fossil fuels to low carbon electricity.</p>	

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<p>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.</p> <p>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</p>			

Key Issue and summary of baseline situation/information	Summary of likely evolution of the baseline without the new Nuclear NPS (direction of condition trend)	Implications and Opportunities for the new Nuclear National Policy Statement	AoS Objective (see Section 6)
towns and villages distributed throughout the regions.			
<p>Communities: Supporting Physical Infrastructure – infrastructure investment is delivered by a range of providers across the UK and can often be reactive. Significant new infrastructure, or upgrades to existing infrastructure, are planned across a range of sectors. This includes the Energy sector - to ensure that there is sufficient electricity to meet demand, new electricity infrastructure will have to be built to replace output from retiring plants and to ensure the UK can meet increased demand. Government analysis suggests that even with major improvements in overall energy efficiency, and increased flexibility in the energy system, demand for electricity is</p>	<p>Improving</p> <p>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.</p>	<p>In addition to the generation of nuclear power and its distribution, the NPS will need to consider the effects of construction, operation and decommissioning on the transport network, including road, rail, air and sea, and will need to explore how new nuclear generation development can provide support for, or opportunities for, utilisation of electric vehicles and more sustainable modes of transport, including for freight.</p>	<p>Promote sustainable transport and minimise detrimental impacts on strategic transport network and disruption to basic services and infrastructure</p> <p>To promote a strong economy with opportunities for local communities</p>

Key Issue and summary of baseline situation/information	Summary of likely evolution of the baseline without the new Nuclear NPS (direction of condition trend)	Implications and Opportunities for the new Nuclear National Policy Statement	AoS Objective (see Section 6)
<p>likely to increase significantly over the coming years and could more than double by 2050 as large parts of transport, heating and industry decarbonise by switching from fossil fuels to low carbon electricity.</p> <p>There is a well-established electricity generation and distribution network across the United Kingdom, 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.</p> <p>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</p>			

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<p>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.</p> <p>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</p>			

Key Issue and summary of baseline situation/information	Summary of likely evolution of the baseline without the new Nuclear NPS (direction of condition trend)	Implications and Opportunities for the new Nuclear National Policy Statement	AoS Objective (see Section 6)
<p>generally rural and in areas of low population.</p> <p>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.</p> <p>Major airports are located in proximity to many of the significant urban centres such as London (various), Manchester, Birmingham, Bristol, Liverpool, Leeds and Newcastle, with smaller airports at Southampton, Exeter, Bournemouth, Southend and Norwich. Note that the airport at Sheffield Doncaster has ceased operations as of November 2022.</p>			

Key Issue and summary of baseline situation/information	Summary of likely evolution of the baseline without the new Nuclear NPS (direction of condition trend)	Implications and Opportunities for the new Nuclear National Policy Statement	AoS Objective (see Section 6)
<p>There are also a large number of smaller airfields and airfields relating to defence or specific industrial establishments, such as that at Hawarden in North Wales serving Airbus. In Wales, there is one major airport at Cardiff.</p> <p>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.</p>			

Key Issue and summary of baseline situation/information	Summary of likely evolution of the baseline without the new Nuclear NPS (direction of condition trend)	Implications and Opportunities for the new Nuclear National Policy Statement	AoS Objective (see Section 6)
<p>Provision of gas networks is variable across the country.</p> <p>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.</p>			
<p>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 Wales. Many indicators reflect 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</p>	<p>Stable / Uncertain</p> <p>There is uncertainty over issues such as COVID-19 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.</p>	<p>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 strengthened multi-functional green infrastructure network; and policy approaches designed to reduce air and water pollution, decreasing noise pollution and reducing traffic congestion. Good design principles can combine with</p>	<p>Improve health and well-being and safety for all citizens and reduce inequalities in health</p>

Key Issue and summary of baseline situation/information	Summary of likely evolution of the baseline without the new Nuclear NPS (direction of condition trend)	Implications and Opportunities for the new Nuclear National Policy Statement	AoS Objective (see Section 6)
<p>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 well-being.</p> <p>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.</p> <p>It is still unclear what impact the Covid-19 pandemic has had on</p>	<p>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.</p>	<p>broader green infrastructure as key factors in fostering active travel, recreation and healthy lifestyles.</p> <p>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.</p> <p>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.</p>	

Key Issue and summary of baseline situation/information	Summary of likely evolution of the baseline without the new Nuclear NPS (direction of condition trend)	Implications and Opportunities for the new Nuclear National Policy Statement	AoS Objective (see Section 6)
<p>measurements of health and well-being across the UK, however it is clear that the labour market shocks associated with the pandemic have been felt more by young people and the lowest paid. Young people and those on low incomes have also been hit hardest by the ‘cost of living’ crises and other economic shocks.</p> <p>According to data from the Measuring National Well-being Programme (MNW), the average ranking of life satisfaction of people aged 16 years and over in the UK was 24.3 out of 35 in 2018/19.</p> <p>The MNW programme data also showed that in Quarter 4 of 2022, 32.1% of adults in the UK rated how worthwhile they feel the things they do in life are, as very high.</p>		<p>The NPS needs to ensure that nuclear energy developments are safe, both in terms of accidents and engendering a perception of safety.</p>	

Key Issue and summary of baseline situation/information	Summary of likely evolution of the baseline without the new Nuclear NPS (direction of condition trend)	Implications and Opportunities for the new Nuclear National Policy Statement	AoS Objective (see Section 6)
<p>When the MNW programme asked adults to rate how happy they were, 29.4% rated their happiness as very high. Similarly, across the UK life satisfaction was ranked as very high by 23.3% of adults.</p>			

6: Appraisal of Sustainability Framework

6.1: Introduction

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 implementing the NPS. The appraisal objectives described in this section have been 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 A). Their development 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 were also developed for each of the objectives to illustrate its relevance to nuclear infrastructure development and give more detail and focus to the appraisal process. Table 6-1 sets out the AoS Framework.

Table 6-1: Appraisal of Sustainability Framework

No	AoS Objective	Guide Questions
1	Consistent with the national target of reducing carbon emissions to Net Zero by 2050	<p>Will the new Nuclear NPS...</p> <ul style="list-style-type: none"> • Reduce carbon emissions of the national portfolio of major energy infrastructure? • Reduce direct and indirect emissions of all greenhouse gases, including carbon dioxide, during construction, operation and decommissioning? • Use carbon removals to offset residual emissions from energy such Negative Emissions Technologies (NET) and Nature Based Solutions (NBS)? • Create new carbon sinks/removals through natural sequestration including that by natural habitats, blue-green infrastructure and soils?
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 *	<p>Will the new Nuclear NPS...</p> <ul style="list-style-type: none"> • 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 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? • Ensure provision of appropriate compensatory measures is in place when there is no other option to land take from areas of flood plain?

	<p>*Adaptation is about taking steps to live with the effects of climate change such as building quay walls and flood barriers.</p> <p>Resilience is the ability of a system to adsorb and bounce back after an adverse event.</p>	<ul style="list-style-type: none"> • Manage the risks of flooding and coastal erosion, particularly through working with natural processes?
<p>3</p>	<p>Enhance biodiversity and ecological networks, deliver biodiversity net gain, protect and support ecosystem resilience and functionality</p>	<p>Will the new Nuclear NPS...</p> <ul style="list-style-type: none"> • Protect and enhance nationally designated sites such as SSSIs, 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? • Reduce or avoid impacts to habitats with important roles in carbon sequestration? • Promote new habitat creation or restoration and linkages with existing habitats? • Encourage sensitive or nature inclusive design in terrestrial and marine environments? • Ensure energy activities protect fish stocks and marine mammals?

		<ul style="list-style-type: none"> • 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	<p>Protect and enhance sites designated for their international importance for nature conservation purposes</p> <p><i>(linked to separate HRA process for new Nuclear NPS)</i></p>	<p>Will the new Nuclear NPS...</p> <ul style="list-style-type: none"> • 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) both onshore and offshore? • Support continued improvements to the condition status of the UK's national site network?
5	<p>Protect and enhance cultural heritage assets and their settings, and the wider historic environment</p>	<p>Will the new Nuclear NPS...</p> <ul style="list-style-type: none"> • 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?

		<ul style="list-style-type: none"> • 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	<p>Will the new Nuclear NPS...</p> <ul style="list-style-type: none"> • Ensure avoidance of development in National Parks and National Landscapes (formerly AONBs)? • Support the integrity of any areas designated for landscape value and natural beauty, 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 tranquillity /preserve tranquillity? • 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?
7	Protect and enhance the water environment	<p>Will the new Nuclear NPS...</p> <ul style="list-style-type: none"> • 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)?

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		<ul style="list-style-type: none"> • 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 local, regional, national and international scale	<p>Will the new Nuclear NPS...</p> <ul style="list-style-type: none"> • 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	<p>Will the new Nuclear NPS...</p> <ul style="list-style-type: none"> • 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?
10	Protect, enhance and promote geodiversity	<p>Will the new Nuclear NPS...</p> <ul style="list-style-type: none"> • Protect and enhance geodiversity resource? • Protect or enhance SSSIs designated for their geological interest?

		<ul style="list-style-type: none"> • 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	<p>Will the new Nuclear NPS...</p> <ul style="list-style-type: none"> • Prevent accidental radioactive discharges or exposure to radiation, including interim storage of waste that may adversely affect the health of local communities? • Lead to concerns / perception of increased risk? • Minimise issues that can affect communities and their facilities including air, noise and light pollution, as well as vibration? • Result in the 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? • Reduction of inequalities between different groups in society?
12	Promote sustainable transport and minimise detrimental impacts on strategic transport network and disruption to basic services and infrastructure	<p>Will the new Nuclear NPS...</p> <ul style="list-style-type: none"> • 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? • Reduce travel distances to work and reduce the need for out commuting?

<p>13</p>	<p>Promote a strong economy with opportunities for local communities</p>	<p>Will the new Nuclear NPS ...</p> <ul style="list-style-type: none"> • 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, house prices and land values? • Have disproportionate effects on specific groups? • Delivery of infrastructure to support economic investment in the local economy?
<p>14</p>	<p>Promote sustainable use of resources and natural assets</p>	<p>Will the new Nuclear NPS...</p> <ul style="list-style-type: none"> • Provide for safe and secure interim storage of nuclear and other wastes where necessary? • 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?

7: Assessment of New Nuclear EN-7

7.1: Introduction

The findings of the AoS of the draft EN-7 are set out in this section of the report and address each of the 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.

Draft EN-7 covers three types of nuclear generation technology (SMR, AMR and nuclear reactors over 1GW). SMR and AMR are of modular nature, of smaller output and have smaller land requirements, with the possibility of adding reactors over time at a given site and reach GW scale. Nuclear reactors over 1GW, on the other hand, are the largest output reactors and have the largest land and resources needs from the outset. Therefore, the AoS takes a conservative approach and focuses on the assessment of the effects of nuclear reactors over 1GW reflecting the larger scale of effects anticipated on any given site.

The AoS focuses on the identification of technology specific effects of the draft EN-7 with consideration of relevant policy for generic effects as set out in EN-1 and of relevant assessments in the AoS of EN-1, in order to establish whether additional mitigation would be required to address the identified technology specific effects. Thus, an assessment of residual technology specific effects after the application of mitigation is provided for the draft EN-7

The 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 nuclear energy infrastructure and the area (or alternative areas) within which it could be located.

The assessments of the draft EN-7 are undertaken in the absence of CNP policy and the results detailed in this report reflect how it is considered the draft EN-7 performs in sustainability terms, before application of CNP policy by the Secretary of State (see below for summary of assessment results of application of CNP as presented in AoS-1).

For each AoS Objective, the process of assessment has been undertaken in two steps, by first identifying the anticipated effects of the technologies set out in EN-7, second considering how policies in the draft EN-7 address the AoS guide questions and finally conclusions of the assessment are made of the likely residual technology effects over the short, medium and long term as defined in section 3.3 Temporal Scope.

Recommendations for clarifying and strengthening of the NPS were discussed with DESNZ in an iterative fashion and the following sets out the assessment of the NPS as published for

public consultation. Recommendations made in earlier stages of the AoS have been addressed or embedded in EN-7 text and are noted in Appendix D.

Assessment of Critical National Priority

EN-1 sets out that there is a critical national priority (CNP) for the provision of nationally significant low carbon infrastructure and that includes nuclear infrastructure. CNP will only be applied in exceptional circumstances by the Secretary of State, when the measures and approaches outlined in EN-1 have not been able to address all residual effects. The CNP policy will influence how non-HRA and non-MCZ residual impacts are considered in the planning balance and the Secretary of State will consider whether tests requiring clear outweighing of harm, exceptionality, or very special circumstances have been met by a CNP Infrastructure application. The CNP policy will also influence the Secretary of State's approach to HRA derogations and MCZ assessments. Where, following HRA Appropriate Assessment, CNP Infrastructure has residual adverse impacts on the integrity of sites forming part of the UK national site network, either alone or in combination with other plans or projects, the Secretary of State will consider making a derogation under the Habitats Regulations. Similarly, if during an MCZ assessment, CNP Infrastructure has residual impacts which significantly risk hindering the achievement of the stated conservation objectives for the MCZ, the Secretary of State will consider making a derogation under section 126(7) of the Marine and Coastal Access Act 2009.

CNP policy was assessed in the AoS of EN-1 which concluded that robust measures to ensure environmental protection will be provided for the vast majority of environmental issues associated with energy infrastructure as set out in EN-1. It is only in exceptional circumstances, where significant 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. The AoS of EN-1 concluded that the application of CNP will have positive effects 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 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 significantly negative.

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

Anticipated Effects

Nuclear energy plays an important part in achieving the national target of net zero by 2050 through the provision of low-carbon electricity. The operation of nuclear infrastructure will result in significant savings of GHG emissions (i.e. offset many million tonnes of CO₂ emissions) through the amount of low-carbon electricity it will produce, as compared to more carbon intensive energy production technologies such as natural gas fired power stations, over an at least 60-years operational life. However, it needs to be recognised that nuclear infrastructure is not completely net zero as residual GHG emissions are generated throughout its life cycle.

The construction phase of nuclear infrastructure will generate substantial emissions of GHG (predominantly CO₂ emissions) during construction. These construction emissions can amount to several million tonnes for >1 GW scale nuclear infrastructure. The nuclear power station building is expected to represent the majority of the emissions during this phase, mainly due to emissions associated with the high embodied carbon nature of the materials used during its construction, followed by the emissions from construction of the interim nuclear waste storage building. Construction transportation emissions are expected to represent a much smaller, but nevertheless important, proportion of the emissions. There are a wide range of mitigation measures available to help address the production of emissions during construction. These measures include the reduction of overall requirement for construction materials, reduction to construction programme, use of more efficient, low or zero emission vehicles and construction plant and equipment, low carbon design and use of low carbon fuel sources. However, the nuclear industry requirements for high embodied carbon construction materials such as concrete and steel means that non-negligible residual emissions will remain and which will need to be addressed.

While there will be significant amounts of low carbon electricity produced across the operational phase, it is important to also recognise that the operation phase will result in some residual GHG emissions (predominantly CO₂ emissions). Operation of the power station itself is expected to be the main source of emissions, mainly due to emissions from fuel oil use in boilers for heating and hot water, emissions associated with maintenance and refurbishment activities (transport and embodied carbon of materials) and the embodied carbon associated with extraction, enrichment and transportation of the nuclear fuel. Operation of the interim storage of nuclear waste and spent nuclear fuel building and the packaging of nuclear waste in appropriate containers will also generate GHG emissions alongside the embodied carbon associated with the containers. Mitigation measures such as buildings heat and air conditioning optimisation, low carbon plant and equipment and supply of low carbon electricity from the nuclear power station can be applied during this phase. Whilst it is noted that any residual GHG emissions generated during operation could be considered to be fully offset by the continuous GHG emissions savings due to the production of low-carbon electricity over its lifetime, the emissions associated with obtaining and transporting nuclear fuel will still occur elsewhere.

Decommissioning activities in the long term are expected to result in some GHG emissions (predominantly CO₂ emissions) over a relatively long timeframe (30 years after closure of the nuclear infrastructure). GHG emissions are anticipated to be much lower than those during the construction phase because of expected advances in zero carbon emissions vehicles and machinery by the time decommissioning takes place, together with the need for less earth movements and less transportation of materials to and off the site in comparison to construction.

Facilities and activities associated with the interim storage of nuclear waste and spent nuclear fuel may remain operational up to 100 years after last refuelling. Energy from other sources rather than the nuclear power station for air conditioning, materials for maintenance etc will be necessary to keep such facilities operational. However, GHG emissions are expected to be very low as they will occur in a Net Zero world where it is expected energy sources and materials embodied carbon will have been decarbonised.

Despite the significant reductions that can be achieved through mitigation during construction, operation and decommissioning as discussed above, residual GHG emissions will still occur as a result of nuclear energy generation. To get to net zero, any residual GHG emissions released need to be balanced by schemes that offset the same amount of GHG emissions entering the atmosphere. Available methods of removal include Negative Emissions Technologies (NET) and Nature Based Solutions (NBS). NET include Bio-Energy with Carbon Capture and Storage (BECCS) and Direct Air Carbon Capture and Sequestration (DACCS) and NBS involve schemes which protect and restore forests and wetlands to achieve negative emissions by biological sequestration.

Assessment made in respect of EN-7

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

Section 2.5 Climate change adaptation and mitigation of draft EN-7 seeks to help to achieve the government's policy to mitigate climate change, such as the Net Zero Strategy, by supporting the appropriate development of nuclear infrastructure. An appropriate increase in nuclear infrastructure is expected to increase the proportion of energy supplied by low carbon sources and reduce the proportion provided by fossil fuels, and thus reduce the UK's greenhouse gas emissions.

Section 3 The need for new nationally significant energy infrastructure projects of EN-1 further sets out nuclear, alongside other technologies could also offer broader system benefits, such as low carbon hydrogen production through electrolysis, or low carbon heat. In addition, nuclear generation provides security of supply benefits by utilising an alternative fuel source to other thermal plants, with a supply chain independent from gas supplies.

Nuclear energy infrastructure will therefore play a very significant role in helping to ensure that the carbon emissions of the national portfolio of major energy infrastructure is reduced.

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

EN-7 refers to Section 5.3 Greenhouse Gas Emissions of EN-1 that notes the construction, operation and decommissioning of all energy infrastructure, including nuclear energy, will in itself lead to GHG emissions. While all steps should be taken to reduce and mitigate climate change impacts, it is accepted that there will be residual emissions from energy infrastructure, particularly during the economy wide transition to net zero, and potentially beyond.

EN-1 therefore requires that all proposals for energy infrastructure projects should include a carbon assessment as part of their ES. This should include:

- A whole life GHG assessment showing construction, operational and decommissioning GHG 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 carbon 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.

A GHG assessment should be used to drive down GHG emissions at every stage of the proposed development and ensure that emissions are minimised as far as possible for the type of technology, taking into account the overall objectives of ensuring supply of energy always remains secure, reliable and affordable, in the transition to net zero.

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

EN-1 Section 5.6 Greenhouse Gas Emissions GHG Assessment requires an application to set out whether and how any residual GHG emissions will be (voluntarily) offset or removed using a recognised framework.

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

EN-1 Section 5.6 Greenhouse Gas Emissions sets 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.

Assessment Conclusions and Summary

In view of the anticipated effects described, and considering the requirements in draft EN-7 and EN-1 as discussed above, Table 7-1 provides the assessment of EN-7. Significant beneficial effects are predicted in the medium term i.e. during operation due to the production of very significant quantities of low carbon energy over the lifetime of the nuclear infrastructure. The quantities of energy supplied will be critical in helping to decarbonise the energy network through providing low-carbon electricity for homes, transport and industry alongside other benefits such as providing stability and resilience to electrical grids, facilitating the wider integration of variable renewables such as wind and solar and helping provide heat and hydrogen to decarbonise hard-to-abate sectors such as industry and transportation.

It is considered that minor negative effects will occur in the short (construction), medium (operation) and long (decommissioning) term reflecting the residual emissions from nuclear infrastructure associated with transportation and embodied carbon, though it is anticipated that as new approaches to construction/deconstruction such as use of low/zero carbon plant and the use of low carbon electricity during operation, these emissions will become residual. Residual emissions will also remain associated with obtaining and transporting nuclear fuel. These residual emissions can be balanced by negative emissions through voluntary or sectoral arrangements as set out in EN-1 but there is no certainty at present of when these arrangements will come into place so residual emissions can still be expected to occur.

Decommissioning in the long term will likely bring temporary minor negative effects similar to those for construction but effects will eventually become neutral through the cessation of operational aspects. It is to be noted that considerations made above are for large scale nuclear facilities – SMR and AMR power stations can be anticipated to result in less GHG emissions during all phases due to their much smaller size individually. However, if SMR and AMR are installed throughout the country to supply the equivalent output as a large scale nuclear facility, they will likely result in cumulative effects of similar magnitude.

Table 7-1: Reducing Carbon emissions to Net Zero Objective Summary

AoS Objective 1: Consistent with the national target of reducing carbon emissions to Net Zero by 2050	Assessment of technology specific effects (by timescale)		
	S	M	L
Guide questions: <ul style="list-style-type: none"> • Reduce carbon emissions of the national portfolio of major energy infrastructure? • Reduce direct and indirect emissions of all greenhouse gases, including carbon dioxide, during construction, operation and decommissioning? • Use carbon removals to offset residual emissions such Negative Emissions Technologies (NET) and Nature Based Solutions (NBS)? • Create new carbon sinks/removals through natural sequestration including that by natural habitats, green-blue Infrastructure and soils? 	-	-/++	-

7.3: 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

Nuclear energy infrastructure design will need to adapt and incorporate a greater degree of resilience to the unavoidable impacts of climate change. These impacts include 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.

Nuclear energy design to protect against extreme events may impact flood risk and coastal change and erosion resulting in increased risks elsewhere on built assets, communities and people and well as also on natural assets, species and habitats.

Nature-based solutions such as tree planting or peat restoration for carbon sequestration (as discussed in section 7.1) also have a role in climate change adaptation.

Assessment made in respect of EN-7

Draft EN-7 sets out that climate change considerations are embedded within the relevant Factors Influencing Site Selection, Technical Considerations and nuclear-specific Impacts which ensures applicants incorporate the potential impacts of climate change into their assessments and the development proposals for which they are seeking Development Consent.

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

Draft EN-7 Section 2.5 Climate change adaptation and mitigation seeks to help achieve the government's climate change adaptation policy by requiring applicants to bring forward proposals that will be resilient to the effects of climate change, without increasing risks elsewhere. As climate change is likely to increase risks to infrastructure, for example from flooding or rising sea levels, applicants must set out how their proposed infrastructure would be resilient to:

- Increased risk of flooding, and taking into account the long-term implications of flood risk;
- Coastal erosion and increased risk of storm surge and rising sea levels;
- Higher temperatures;
- Increased risk of drought, which could lead to a lack of available process water;
- Risks from cascading failures across multiple sectors or infrastructure networks; and
- Any other risks and safety considerations likely to be impacted by 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)?

Section 4.10 Climate Change Adaptation and Resilience of EN-1, to which EN-7 refers, sets out generic considerations that applicants and the Secretary of State must take into account to help ensure that nuclear infrastructure is resilient to climate change. Applicants must consider the impacts of climate change when planning the location, design, build, operation and, where appropriate, decommissioning of new energy infrastructure. Applicants should ensure that the ES sets 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, 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.

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; 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; and 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.

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

Addressing risks of climate induced risks of cascading failures are a specific requirement for planning applications under draft EN-7 Section 2.5 Climate change adaptation and mitigation (see above).

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?

Section 4.10 Climate Change Adaptation and Resilience of EN-1, to which EN-7 refers, sets out that necessary action can be taken to ensure the operation of the infrastructure over its estimated lifetime which will include construction, operation, decommissioning, and the storage of waste and spent fuel. 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. Moreover, 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.

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).

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

EN-7 sets out in Section 7 Impacts Flood Risk that nuclear infrastructure occupies large sites and need to consider flood risk both at a site level and across the surrounding area to ensure the risk of flooding is mitigated or adapted to. Section 5.8 Flood Risk of EN-1 sets out the generic Flood Risk requirements of major energy infrastructure and the assessments that must be undertaken. In particular, it states the need 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 flood risk areas (for example where there are no reasonably available sites in areas at lower risk), policy aims to make it safe for its lifetime 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.

EN-7 sets out in Section 7 Impacts Coastal and other Landform Change that nuclear infrastructure development can impact on the natural functioning of water bodies in coastal, estuarine, riverine and lacustrine locations, with consequential impacts on erosion and other forms of landform change and it effectively extends the provisions of Section 5.6 of EN-1 on Coastal Change to estuarine, riverine and lacustrine locations. The applicant is urged to engage with relevant statutory bodies at an early planning stage to understand the steps they may have to take to secure Development Consent. On coastal and other landform change, this early engagement should include the Environment Agency and/or Natural Resources Wales, and any relevant Local Authority, on any measures that may be required to secure Development Consent through the assessment and management of coastal, estuarine, riparian and lacustrine erosion. The applicant must assess the impact of the construction, operation, decommissioning, and the storage of waste and spent fuel relating to the proposed nuclear infrastructure on coastal change and other landform change scenarios including riverine and lacustrine erosion and other risks due to being located near a lake, estuary or reservoir. The

applicant must include within their application for Development Consent any measures to mitigate the effects of, and on, coastal change and other landform change scenarios including riverine, lacustrine and estuarine erosion of the proposed nuclear infrastructure, including during the construction, operation, decommissioning, and the storage of waste and spent fuel. And the Secretary of State must be satisfied that where proposals may impact estuarine, riverine and lacustrine erosion, the same expectations set out in paragraphs 5.6.16 to 5.6.23 of EN-1 for Coastal Erosion, will be met by the proposed nuclear infrastructure in relation to estuarine, riverine and lacustrine erosion where relevant.

EN-1 Section 5.6 Coastal Change deals 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: i. 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 ii. 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.

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

Section 5.8 Flood Risk of EN-1 sets out that where new energy infrastructure is, exceptionally, necessary in flood risk areas (for example where there are no reasonably available sites in areas at lower risk), policy aims to make it safe for its lifetime 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. If, following application of the Sequential Test, it is not possible, (taking into account wider sustainable development objectives), for the project to be located in areas of lower flood risk the Exception Test can be applied. The test provides a method of allowing necessary development to go ahead in situations where suitable sites at lower risk of flooding are not available. It would only be appropriate to move onto the Exception Test when the Sequential Test has identified reasonably available, lower risk sites appropriate for the proposed development where, accounting for wider sustainable development objectives, application of relevant policies would provide a clear reason for refusing development in any alternative locations identified. 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.

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

Section 4.10 Climate Change Adaptation and Resilience of EN-1, to which EN-7 refers, sets out that in preparing measures to support climate change adaptation, applicants should consider whether take reasonable steps to maximise use of nature-based solutions alongside other conventional techniques. Integrated approaches, such as looking across the water cycle considering coordinated management of water storage, supply, demand, wastewater and flood risk can provide further benefits to address multiple infrastructure needs, as well as carbon sequestration benefits could provide a basis for such adaptation. In addition to avoiding further GHG emissions when compared with some more traditional adaptation approaches, nature based solutions can also result in biodiversity benefits and net gain as well as increasing absorption of carbon dioxide from the atmosphere.

Assessment Conclusions and Summary

Considering the policies in EN-1 and draft EN-7 as discussed above, and the assessment made of draft EN-7, the conclusion is that AoS Objective 2 is addressed comprehensively by the policies in draft EN-7 and EN-1. The summary assessment is set out in Table 7-2.

The policies set out in EN-1 ensure the latest UK Climate Projections and associated research and expert guidance will be taken into account and that impacts on and from proposed energy projects 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.

EN-1 details 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. Draft EN-7 recognises that nuclear development may involve estuarine, riverine and lacustrine locations, as well as coastal locations, and extends the requirements of EN-1 to consider effects from riverine, lacustrine and estuarine erosion.

EN-1 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.

EN-1 sets out that applicants should consider whether 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 the application of requirements in EN-1 and draft EN-7 will maximise adaptation and resilience to climate change of nuclear infrastructure through promoting future proofing against the effects and risks of climate change in coastal, estuarine and lacustrine locations, and working with natural processes to minimise such effects and risks, with significant beneficial effects predicted over the short, medium and long term.

Table 7-2: Maximise adaptation and resilience to climate change Objective Summary

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	Assessment of technology specific effects (by timescale)		
	S	M	L
Guide questions: <ul style="list-style-type: none"> Promote future proofing against the effects and risks of climate change (e.g. flooding, sea 	++	++	++

<p>level rise, coastal erosion and change in weather patterns)?</p> <ul style="list-style-type: none"> • 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 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? • Ensure provision of appropriate compensatory measures is in place when there is no other option to land take from areas of flood plain? • Manage the risks of flooding and coastal erosion, particularly through working with natural processes? 			
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7.4: 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 nuclear development enabled by the draft EN-7 has the potential for a range of effects on the natural environment and biodiversity. This includes loss of habitat and species, habitat fragmentation/severance/isolation, disturbance, pollution, obstructions, changes to terrestrial microclimates and changes to coastal and marine processes due to construction, operation and decommissioning activities associated with nuclear energy infrastructure.

Large scale nuclear energy technology is associated with the need for large volumes of cooling water; this indicates that coastal, estuarine and riverine locations are likely to be preferred. Such locations are often associated with marginal habitats, specialist species and valuable ecological environments. Development in such locations increases the risk of permanent habitat fragmentation and loss with associated risks of species loss and isolation. In addition, the water cooling systems can result in both direct and indirect effects on aquatic biodiversity, including:

- the discharge of water at higher temperatures than receiving waters, which is likely to have an effect on aquatic flora and fauna,
- effects from the abstraction of water that will reduce flows in water courses, resulting in negative effects on aquatic flora and fauna habitat,
- fish impingement and/or entrainment” – i.e. being taken into the cooling system during abstraction; and
- release of chemical anti-fouling substances, used in the treatment of water for use in cooling systems, into the water environment.

Other potential adverse effects arise from surface water and wastewater discharge, coastal squeeze; species disturbance events (noise and visual) and air quality. These are most likely to be significant during the construction and operational stages of the power stations and could also be significant during decommissioning.

Potential adverse effects on biodiversity can be mitigated, for example through project design to avoid sensitive and high value areas and minimise footprint; habitat retention and species protection measures on site, buffer zones to avoid or minimise disturbance to habitats and wildlife, treatment of any discharges prior to release into the water environment, air and soil pollution control measures; and design of cooling water system so as to minimise modification of sedimentary and hydrodynamic processes, avoid the entrainment and impingement of marine organisms and promote sufficient mixing and dispersal.

Assessment made in respect of EN-7

Protect and enhance nationally designated sites such as SSSIs, 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?

Section 5.4 of EN-1, to which EN-7 refers, sets out guidance for the protection of nationally and internationally designated sites of ecological and geological importance, including Habitats sites, Sites of Special Scientific Interest, Marine Conservation Zones and Protected Areas, regional and local sites, ancient woodland and wider protection and enhancement of habitats and species. Section 5.4 of EN-1 also provides specific detail on how each type of designation impacts how that site should be protected.

EN-7 recognises that biodiversity merits consideration during initial site assessment for nuclear infrastructure and again during the development of the nuclear infrastructure design and stresses that the choices which applicants make in selecting sites reflect their assessment of the risk that the Secretary of State does not grant Development Consent in any given case.

Section 2.7 Factors influencing site selection of EN-7 urges the applicant to make early contact with the relevant statutory bodies, including the Environment Agency, Marine Management Organisation, Natural Resources Wales and Natural England where appropriate, for relevant siting advice and licensing and environmental permitting requirements. The applicant should also make early contact with relevant statutory bodies in Scotland and Northern Ireland where there is the potential for transboundary effects on biodiversity.

Section 2.7 of EN-7 also sets out the requirements placed on an applicant during the initial site assessment. These include the applicant assessing any potential impact on biodiversity and any subsequent mitigations needed to meet biodiversity and environmental net gain requirements in accordance with the obligations set out in paragraphs 4.6.6 to 4.6.18 of EN-1; assessing any potential impact on the conservation of biodiversity and geology as set out in paragraphs 5.4.17 to 5.4.34 of EN-1; assessing whether the need to implement the mitigation hierarchy set out in EN-1 may make one or more reasonable alternative sites more suitable than the proposed site from an overall cost and delivery perspective; and considering how the cooling system approach may affect the level of impact on a designated site of ecological importance and the level of mitigation required. The applicant should refer to the Water Quality and Resources nuclear impact in Section 2.9 in EN-7 where this is set out in further detail.

Section 2.9 Impacts of EN-7 sets out that during the development of the nuclear infrastructure design, the applicant must follow the requirements for assessing biodiversity and environmental net gain set out in EN-1 Sections 4.6 and 5.4. In addition, it sets out that the applicant must take into account the full life cycle of the nuclear infrastructure, including construction, operation, decommissioning, and the storage of radioactive waste and spent fuel, as well as any temporary construction needed to support these phases when assessing the

requirements of the mitigation hierarchy in relation to the proposed nuclear infrastructure; undertake baseline studies on nationally and internationally important habitats and species that may be affected because of the development to inform the assessment of the cumulative and in-combination ecological effects; and establish which relevant plans and projects should be included within the cumulative assessment. In addition to informing the cumulative assessment, baseline data on the proposed site and surrounding area is also required for other environmental assessments, such as a Habitats Regulations Assessment where applicable.

The applicant must implement the mitigation hierarchy as set out in EN-1 to protect the environment and biodiversity, including relevant measures to mitigate the biodiversity impact of air quality and emissions as set out in Section 5.2 of EN-1. In addition to the options for addressing the mitigation hierarchy set out in paragraphs 5.4.35 to 5.4.38 EN-1, the applicant must implement further possible mitigation or avoidance options including variations to building layout to avoid ecologically sensitive areas and on-site measures to protect habitats and species and to avoid or minimise pollution and the disturbance of wildlife.

The Secretary of State must be satisfied that the proposed development will appropriately manage impacts on biodiversity and geology, in accordance with paragraphs 5.4.39 to 5.4.55 of EN-1. The Secretary of State must consider duties under other legislation including duties under the Environment Act 2021 in relation to environmental targets and have regard to the policies set out in the government's Environmental Improvement Plan.

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

EN-1 Section 4.5 Marine Considerations recognises that some effects of energy infrastructure may also be felt in the marine environment and applicants for a DCO must take account of any relevant Marine Plans and are expected to complete a Marine Plan assessment as part of their project development, using this information to support an application for development consent.

Applicants are also encouraged to refer to Marine Plans at an early stage, such as in pre-application, to inform project planning, for example to avoid less favourable locations as a result of other uses or environmental constraints.

Protect and enhance the Nature Recovery Network?

EN-1 Section 4 references how the Environment Act 2021 mandated the preparation of Local Nature Recovery Strategies (LNRSs) across England and how such strategies will also drive the creation of a Nature Recovery Network (NRN), a major commitment in the government's 25 Year Environment Plan.

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

EN-1 Section 4 on Protection and enhancement of habitats and species sets out that many individual species receive statutory protection under a range of legislative provisions and that 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.

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

EN-1 Section 5.4 sets 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.

EN-1 Section 5.4 also sets out that permission for development that would result in the loss or deterioration of any irreplaceable habitats, including ancient woodland, and ancient and veteran trees should not be granted consent unless there are wholly exceptional reasons, and a suitable compensation strategy exists.

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

EN-1 Section 5 sets 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 but that is not included in this assessment.

EN-1 Section 5 also sets 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.

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, including 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.

EN-1 Section 4 adds 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.

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

EN-1 Section 5 states 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 nuclear energy infrastructure could occur anywhere within England and Wales, both inland and onshore, 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.

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

Section 5.4 of EN-1, to which EN-7 refers, highlights how applicants should consider 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 includes considering and aligning with Local Nature Recovery Strategies (LNRS) and the national goals and targets established under the Environment Act 2021.

Section 4.6 of EN-1 further sets out 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. Reference should be made to relevant national or local plans and strategies, to inform off-site biodiversity net gain delivery. If published, the relevant strategy is the Local Nature Recovery Strategy (LNRS). If an LNRS has not been published, the relevant consenting body or planning authority may specify alternative plans, policies or strategies to use.

EN-1 Section 5 also sets 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.

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

Section 4.6 of EN-1, to which EN-7 refers, sets out guidance on environmental and biodiversity net gain. EN-1 requires energy Nationally Significant Infrastructure Project proposals to seek opportunities to contribute and enhance the natural environment by providing net gains for biodiversity and the wider environment where possible. Clarification is provided that currently biodiversity net gain policy in England only applies to terrestrial and intertidal components of projects and that principles for Marine Net Gain are currently being considered by Government. There are provisions in the Environment Act 2021 to allow Marine Net Gain to be made mandatory for NSIPs in the future. 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.

In England applicants for onshore elements of any development are encouraged to use the latest version of the 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, alongside a completed biodiversity metric calculation, with the Local Authority and Natural England for discussion at the pre-application stage as it can help to highlight biodiversity and wider environmental issues which may later cause delays if not addressed.

In Wales, applicants should consider the guidance set out in Section 6.4 of Planning Policy Wales and the relevant policies in the Wales National Marine Plan.

Biodiversity net gain should be applied after compliance with the mitigation hierarchy and does not change or replace existing environmental obligations, although compliance with those obligations will be relevant to the question of the baseline for assessing net gain and if they

deliver an additional enhancement beyond meeting the existing obligation, that enhancement will count towards net gain.

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

Both EN-1 and EN-7 fall short of recognising that off-site delivery of BNG as part of nuclear development could entail delivering larger landscape scale benefits which will in turn enhance the resilience of key habitats and species to climate change. As local environments adapt to climate change, off-site delivery must incorporate a contingency to compensate for the risk of BNG not being met through designing for resilience and taking an adaptive approach that can respond to future events.

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

Neither EN-4 nor EN-1 state that the design of Energy NSIP proposals will need to prevent the spread of invasive species, including new species because of climate change

Assessment conclusions and summary

The policies set out in 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. EN-1 recognises 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. 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, the Secretary of State will maximise opportunities for biodiversity within developments, using planning obligations. EN-1 further states 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. Considerations of biodiversity in EN-1 also 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 nature conservation designations, EN-1 notes 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. EN-1 suggests 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 that qualify it as a SSSI and impacts on the national network of SSSIs. EN-1 encourages 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. EN-1 notes 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 EN-1 is 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. EN-1 also suggests 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, EN-1 suggests 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.

Importantly, as described above, EN-7 adds new policy at two levels which could act to reduce the significance of negative effects. The requirement for applicants to assess, at the earlier site selection stage, whether the need to implement the mitigation hierarchy (set out in EN-1) may make one or more reasonable alternative sites more suitable than the proposed site. This may result in focusing new nuclear development sites in rural areas of lesser biodiversity value—focusing on such areas and not on those of higher value would allow for less effect on biodiversity and make an application more straightforward as there would be less requirement for mitigation and net gain would be easier to achieve. Then, during project development, in addition to the options for addressing the mitigation hierarchy set out in EN-1, the applicant must implement further possible mitigation or avoidance options including variations to building layout to avoid ecologically sensitive areas and on-site measures to protect habitats and species and to avoid or minimise pollution and the disturbance of wildlife. This will act to further reduce the significance of any negative effects on site and in the immediate vicinity, both during construction and operation. It is therefore possible to conclude that there would generally be minor negative effects in the short and medium term to designated sites of international, national and local importance, protected species, habitats and other species of importance for the conservation of biodiversity as a result of nuclear development coming forward under EN-7. It would be only in the most exceptional circumstances, where it can be demonstrated that the benefit and need of the development outweighs the loss, harm or deterioration, that the Secretary of State would grant consent under the provisions of EN-1 for any such developments with resulting significant negative effects. In those circumstances and taking a precautionary approach, effects would be considered significant adverse and this is reflected in the AoS scoring for this Objective.

During operation, permanent structures associated with new nuclear development in the coastal, estuarine and lacustrine environment have the potential to alter aquatic processes and

wave regimes and affect aquatic species. Such species can also be disturbed throughout operation from noise and changes to water quality from cooling water discharge, maintenance dredging or vessel movements. On land, permanent changes to surface water and groundwater hydrology due to the presence of buildings, foundations, roads and other infrastructure would also be expected during the operational phase potentially impacting surrounding habitats. It is therefore concluded that there will likely be significant negative effects during the operational phase.

Decommissioning could bring negative effects on biodiversity through potential habitat loss and disturbance due to the type of de-construction activities involved. However, mitigation measures such as those utilised during construction can reduce adverse effects, while beneficial effects could be experienced through the cessation of operational aspects such as cooling water discharge and the potential creation of new habitats and biodiversity enhancement through returning the land to previous land uses or other compatible uses.

Significant beneficial positive effects are anticipated in the medium and long term, through the clear approach noted in EN-1 of using the mitigation hierarchy and biodiversity enhancement through an obligation to deliver Biodiversity Net Gain outside national designations. This means that locally designated sites and other habitats areas onsite and/or offsite of a nuclear site will be enhanced as a result of nuclear development.

Table 7-3: Enhance biodiversity and ecological networks, deliver biodiversity net gain, protect and support ecosystem resilience and functionality Objective Summary

AoS Objective 3: Enhance biodiversity and ecological networks, deliver biodiversity net gain, protect and support ecosystem resilience and functionality	Assessment of technology specific effects (by timescale)				
	S	M		L	
<p>Guide questions:</p> <ul style="list-style-type: none"> • Protect and enhance nationally designated sites such as SSSIs, 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? 	--	--	++	--	++

<ul style="list-style-type: none"> • 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? • Reduce or avoid impacts to habitats with important roles in carbon sequestration? • Promote new habitat creation or restoration and linkages with existing habitats? • 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? 					
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7.5: 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 EN-7 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.**

Qualifying features: Nutrient-sensitive habitats (including soils and water) and plants, plus species they support

- **Noise pollution and vibration – arising from construction, operation and decommissioning activities.**

Qualifying features: Bird species; Mammal species; Fish species

- **Light pollution – arising from construction, operation and decommissioning activities.**

Qualifying features: 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.**

Qualifying features: 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.**

Qualifying features: 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.**

Qualifying features: 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.**

Qualifying features: All habitats and species

- **Impingement and entrainment of fish – arising from operation processes such as cooling water intake or turbines generating tidal power.**

Qualifying features: 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. The development of a range of major generating infrastructure that is enabled through EN-1 has the potential to result in direct adverse impacts on habitat sites in the short term, from the construction of developments enabled through EN-1 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.

In parallel with the AoS of the draft EN-7, a HRA has been undertaken to understand the potential for the draft EN-7 at a strategic level to impact the designated features of habitat sites, though HRAs will still need to be undertaken at an individual project level. Where possible, this has established the likelihood of impacts on the integrity of these sites and identified appropriate avoidance and mitigation measures early in the development of the NPS.

Assessment made in respect of EN-7

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) both onshore and offshore?

Section 5.4 Biodiversity and Nature Conservation of EN-1 to which EN-7 refers sets out guidance for the protection of nationally and internationally designated sites of ecological and geological importance, including Habitats sites. It affords the highest level of biodiversity protection to these sites. The Habitats Regulations set out Habitats sites for which an HRA will assess the implications of a plan or project, including Special Areas of Conservation and

Special Protection Areas. EN-1 extends the same protection to (a) potential Special Protection Areas and possible Special Areas of Conservation; (b) listed or proposed Ramsar sites; and (c) sites identified, or required, as compensatory measures for adverse effects on any of the other sites. EN-1 itself has been subject to HRA and draft EN-7's HRA is being carried out alongside this AoS and has informed this assessment.

Where development is subject to EIA, EN-1 suggests that the ES should clearly set out any effects on internationally designated sites of ecological or geological conservation importance.

EN-1 Section 5.4 does not avoid direct loss or indirect harm to Habitats Sites as it focuses on obtaining derogation under the Habitats Regulations. It sets out that if an AA is required, the applicant must provide the Secretary of State with such information as may reasonably be required to enable the Secretary of State to conduct the AA. This should include information on any mitigation measures that are proposed to minimise or avoid likely significant effects. If, during the pre-application stage, Statutory Nature Conservation Bodies (SNBC) indicate that the proposed development is likely to adversely impact the integrity of habitat sites, the applicant must include with their application such information as may reasonably be required to assess a potential derogation under the Habitats Regulations. If the SNCB gives such an indication at a later stage in the development consent process, the applicant must provide this information as soon as is reasonably possible and before the close of the examination. This information must include assessment of alternative solutions, a case for Imperative Reasons of Overriding Public Interest (IROPI) and appropriate environmental compensation.

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

EN-1 clarifies that 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. Statutory Nature Conservation Bodies (SNBC) 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.

Assessment conclusions and summary

Draft EN-7 has been subject to Habitats Regulation Assessment (HRA) to determine whether the 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. Given the strategic nature of the draft

EN-7 and the lack of geographically specific proposals, it allows for potential nuclear energy development to take place in any part of England and Wales and territorial waters. As such, it was not possible for the HRA to conclude that there will be no effects on the integrity of Habitat Sites as a result of development coming forward under the draft EN-7.

Therefore, there is potential for significant negative effects on Habitats Sites as a result of the 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.

Table 7-4: Protect and enhance sites designated for their international importance for nature conservation purposes Objective Summary

AoS Objective 4: Protect and enhance sites designated for their international importance for nature conservation purposes	Assessment of technology specific effects (by timescale)		
	S	M	L
Guide questions: <ul style="list-style-type: none"> • 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) both onshore and offshore? • Support continued improvements to the condition status of the UK’s national site network? 	--	--	--

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

Anticipated Effects

There is a substantial cultural heritage resource across England and Wales and in surrounding seas; although, there is considerable variation in the condition and integrity of assets. Sites and assets range from those recognised at the very highest levels such as the 22 World Heritage Sites, through Scheduled Monuments to listed buildings, Conservation Areas, registered parks and gardens. Offshore, there are a multitude of marine wreck sites, aircraft crash sites or other submerged artefacts. Beyond these examples, there are a large number of undesignated assets or unknown archaeological remains which could have national, regional or local value. Such heritage assets can be considered essentially finite and often irreplaceable.

Due to the nature and scale of nuclear generation facilities, they have the potential to affect cultural heritage assets (including those unknown) and their settings, as well as the wider historic environment. As with other infrastructure, the development of nuclear generation could lead to:

- 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.

Direct effects are likely to occur in the short term during the construction of nuclear generation infrastructure 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 in the case of nuclear facilities is anticipated to be many decades) and decommissioning activities.

In areas where there is a concentration or cluster of nuclear generation infrastructure development there is also particular potential for negative cumulative effects on the setting of heritage assets. The significance of these effects is highly dependent on the location and scale of development, as well as the importance of heritage assets and their setting relative to energy infrastructure.

Assessment made in respect of EN-7

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?

For the most part, EN-7 refers to EN-1 in terms of approach to development and mitigation in respect of cultural heritage assets, setting and the wider historic environment and it is

considered that EN-1 sets out a robust approach to assessment of any development applications. EN-1 also sets 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).

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

EN-1 notes that non-designated heritage assets that have been recognised by the Secretary of State as being of equivalent significance to Scheduled Monuments or Protected Wreck Sites, or that have yet to be formally assessed but have archaeological interest and have potential to demonstrate equivalent significance to Scheduled Monuments or Protected Wreck Sites, should be considered subject to the same policy considerations as those that apply to designated heritage assets.

Specific note is made in EN-7 that Historic England and/or Cadw may be able to help the applicant to mitigate and/or avoid disruption to development by providing advice on the likelihood and likely scale of any archaeological discovery that may occur during construction. It is also noted that unexpected and/or unplanned discoveries normally necessitate delays in construction while the historical and/or heritage assets are recovered. This disruption can be substantially mitigated if contingencies are in place and archaeological resource is kept accessible to the project to promptly deal with any discovery.

Address heritage assets at risk, or protect them from further threats?

Early consultation with statutory bodies (as set out in EN-7 and EN-1) would allow for an understanding of which heritage assets are at risk and how best to protect these. The specific details provided in EN-1 e.g. assessment requirements mean that these issues will be considered. As noted in EN-1 there is a requirement to 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. This can be anticipated to include for those elements of heritage considered at risk.

Avoid significant harm to heritage assets, for example from the generation of noise, pollutants and visual intrusion?

EN-7 notes that the criterion set out in EN-1 includes protection for areas of cultural importance and remains relevant and important for applicants to consider when proposing a project. For example, EN-1 notes 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.

Other elements of both EN-7 and EN-1 deal specifically with issues such as noise or pollutants. It is anticipated that measures outlined there, will also help protect heritage assets.

Ensure appropriate archaeological assessment prior to development?

EN-1 sets 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. EN-7 expands upon this and notes that Historic England and/or Cadw may be able to help the applicant to mitigate and/or avoid disruption to development by providing advice on the likelihood and likely scale of any archaeological discovery that may occur during construction.

EN-1 further notes 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.

Maintain or improve the interpretation, understanding and appreciation of the historic environment?

EN-1 places a 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.

Increase public access to heritage assets?

EN-7 notes that the criterion set out in EN-1 includes protection for areas of cultural importance and remains relevant and important for applicants to consider when proposing a project. These elements include for increasing access to heritage assets – for example, EN-1 notes 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.

Assessment conclusions and summary

There is the potential for minor negative effects (including cumulative effects) on heritage assets in the short, medium and long term as a result of the potential impacts on heritage 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 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 are addressed through the robust approach outlined in EN-7 (with reference made to EN-1).

Note is also made in EN-7 that engagement should take place with Historic England and / or Cadw, as well as relevant local authorities in respect of the historic environment and heritage

and it is considered that this will help ensure full consideration of potential affects and how best to address these.

Table 7-5: Protect and enhance cultural heritage assets and their settings, and the wider historic environment Objective Summary

AoS Objective 5: Protect and enhance cultural heritage assets and their settings, and the wider historic environment	Assessment of technology specific effects (by timescale)		
	S	M	L
<p>Guide questions:</p> <ul style="list-style-type: none"> • 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? • Ensure appropriate archaeological assessment prior to development? • Maintain or improve the interpretation, understanding and appreciation of the historic environment? 	-	-	-

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

Anticipated Effects

As with virtually all nationally significant infrastructure projects, nuclear generating infrastructure will have effects on the landscape and is likely to have visual effects for many receptors around proposed sites. It is to be noted that while nuclear infrastructure would often be in less populated areas, the scale of the facilities means that the scope for reducing visual intrusion is limited. These facilities will also have a long operating life and can essentially be considered permanent features in the landscape.

Nevertheless, landscape (taken to include townscape and waterscape) effects depend on the existing character of the local landscape, its current quality, how highly it is valued and its capacity to accommodate change. Generic effects on landscape from new nuclear generating infrastructure include:

- the introduction of a range of new, industrial structures, (often of significant size and requiring substantial landtake) including long term, permanent structures; and developments that are temporary in the short to medium term;
- introduction of associated outputs 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 nuclear generating infrastructure of a large scale (e.g. coastal locations), currently support a high level of local and national landscape designations. The development of new nuclear facilities are likely to require large scale and tall structures, potentially in existing nuclear generating sites, as well as 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 of development could potentially result in the loss of green infrastructure, greenspace and other features of importance to landscape such as hedgerows, forested areas etc.

The scale and severity of those effects will depend on the overall setting context and the specifics of the site itself. It is recognised that 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 AONBs). It is to be noted that each of these areas has specific statutory purposes that could be adversely affected by development.

Locating new infrastructure adjacent to existing facilities or industrial areas can have beneficial effects, though it would also increase the scale and quantum of development that cumulatively can have major effects, particularly in areas that are rural. Peace and tranquility can be adversely affected by the site itself, but also associated infrastructure and traffic, with night time tranquility particularly affected by light pollution.

Despite the potential for adverse effects, it is also worth noting that large scale power stations, including nuclear infrastructure, can contribute to local distinctiveness and provide a focal point in the landscape, with many people finding them to be interesting visual features in themselves.

Assessment made in respect of EN-7

EN-1 and EN-7 both recognise that the potential for mitigating effects on landscape, or reducing visual intrusion, can be limited due to the scale of the facilities typically required. This is particularly the case for large scale generating sites – smaller modular reactors would provide much greater scope for mitigation. Of particular note in EN-1 is the need for a Landscape and Visual Impact Assessment to be carried out and reported in an ES (including cumulative effects). Note is also to be made of landscape, seascape and marine plan character assessments, as appropriate. Consideration is also to be made of tranquility, including light pollution on dark skies, local amenity and nature conservation.

EN-7 recognises that effects cannot be expected to be eliminated completely, but nevertheless, note is made that there may be opportunity to mitigate some of the landscape and visual impacts by careful consideration of Good Design, site layout, landscaping and making use of the existing land profile. Reference is also made to the requirements set out in EN-5 in respect of effects resulting from associated transmission infrastructure.

Reference is made to EN-1 which states there may be exceptional circumstances where the mitigation of visual and/or landscape impacts that has a very significant benefit warrants a small reduction in function e.g. electricity generation output. In the case of nuclear generation facilities, it is anticipated that this may apply where a small fraction of the energy output of nuclear infrastructure is used to operate powered cooling systems with a substantially reduced visual profile, such as mechanical draft wet cooling, air cooling or mechanical draft hybrid wet and dry cooling.

Ensure avoidance of development in National Parks and National Landscape (formerly AONBs)?

EN-7 recognises the importance of landscape and notes that there may be opportunity to mitigate some of the landscape and visual impacts by careful consideration of Good Design, site layout, landscaping and making use of the existing land profile. This is in line with Levelling-up and Regeneration Act 2023, which states that the relevant authorities must ‘seek to further’ the statutory purposes of Protected Landscapes.¹¹ Note is also made in EN-7 that an early approach should be made to the Planning Inspectorate, Local Authorities, bodies such as

¹¹ <https://www.gov.uk/government/publications/the-protected-landscapes-duty/guidance-for-relevant-authorities-on-seeking-to-further-the-purposes-of-protected-landscapes>

Natural England and Natural Resource Wales, as well as National Park Authorities (including the Broads Authority and Natural Landscape Conservation Boards). Nevertheless, EN-1 does note that in respect of those areas with nationally significant landscape designations, such as National Parks, the Broads, National Landscapes (formerly AONBs) and Heritage Coasts, EN-1 notes 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.

Support the integrity of any areas designated for landscape value and natural beauty, including in conjunction with the provisions of any relevant Management Plan (e.g. National Parks, AONBs, Heritage Coasts and local landscape designations)?

As noted, there is a potential for development to occur in sites designated for landscape value in exceptional circumstances. Nevertheless, in non-exceptional circumstances, EN-1 places strong protection on such areas. For example, EN-1 notes specifically that development within a Heritage Coast (that is not also a National Park, The Broads or an AONB – now known as National Landscape) is unlikely to be appropriate, unless it is compatible with the natural beauty and special character of the area.

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

Both EN-7 and EN-1 require the applicant to consider landscape and visual matters in the early stages of siting – this would include consideration of those landscapes considered important locally etc. Landscape and Visual Impact Assessment is also a requirement to be set out in an ES.

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 character assessment should be paid particular attention. However, local landscape designations should not be used in themselves to refuse consent, as this may unduly restrict acceptable development.

It is also worth noting that some areas may also consider existing infrastructure, including nuclear generating facilities, as reflective of local character, or a key element of the local landscape. As such, it cannot be assumed that all largescale development is automatically considered as negative. EN-7 notes that Good Design principles may enable the nuclear infrastructure to mitigate any negative visual impacts and potentially make a positive contribution to the character of its host location and community. Consultation is encouraged with a range of bodies, including local authorities.

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

Of particular note in EN-1 is the need for a Landscape and Visual Impact Assessment to be carried out and reported in an ES (including cumulative effects). Note is also to be made of landscape, seascape and marine plan character assessments, as appropriate. Consideration is also to be made of tranquillity, including light pollution on dark skies, local amenity and nature conservation. EN-1 also details associated issues such as noise pollution and sets out measures to address this.

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?

EN-1 notes that consideration should be made of how landscapes can be enhanced through landscape management plans as this will help to enhance environmental assets (such as parks, green spaces, woodland etc.) 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 EN-1 sets out a robust approach to addressing impacts on landscape, townscape and waterscape across the short, medium and long timeframes

Assessment conclusions and summary

Significant negative effects for landscape, townscape and visual receptors are likely as a result of the implementation of EN-7 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. Large scale generating sites are likely to have greater significant adverse effects, though it is considered significant effects are also likely for smaller SMR and AMR technology.

However, EN-7 (in combination with EN-1) sets out a robust approach to addressing impacts on landscape, townscape and seascape across the relevant timeframes. Although still considered significant, there is a potential for adverse landscape effects to be reduced as decommissioning progresses.

Table 7-6: Protect and enhance the character and quality of the landscapes and townscapes and waterscapes and protect and enhance visual amenity Objective Summary

AoS Objective 6: Protect and enhance the character and quality of the landscapes and townscapes and waterscapes and protect and enhance visual amenity	Assessment of technology specific effects (by timescale)		
	S	M	L
Guide questions: <ul style="list-style-type: none"> • Ensure avoidance of development in National Parks and National Landscapes (formerly AONBs)? • Support the integrity of any areas designated for landscape value and natural beauty, 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 tranquillity /preserve tranquillity? • 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? 	--	--	--

7.8: AoS Objective 7 Protect and enhance the water environment

Anticipated Effects

Development of new nuclear generating facilities can have implications for the water environment in a number of ways and can affect quality, quantity / resources or flow. Effects can also be experienced across all water body types, depending upon location and technology requirements, including groundwater, inland surface water, transitional waters and coastal waters. Additionally, effects can occur at all phases of development – construction through to decommissioning. It is to be noted that nuclear facilities can be anticipated to be operational for many decades.

Likely generic effects, which are also applicable to nuclear development, are detailed in EN-1 and 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.

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

Of particular note in relation to the effects of nuclear generation on the water environment and which is set out at length in EN-7, is the requirement for cooling water, where a wet cooling system is used and details are provided on the various types of technological approaches in that regard. As set out in EN-7 anticipated potential effects include:

- discharging water at a higher temperature than the receiving water, affecting the biodiversity of aquatic flora and fauna
- use of water which may reduce the flow of water courses, affecting the rate at which sediment is deposited, conditions for aquatic flora and potentially affecting migratory fish species (for example salmon)
- chemical anti-fouling treatment of water for use in cooling systems may have adverse impacts on aquatic biodiversity, and

- potential impacts on groundwater availability and quality.

Note that there are also potential effects on species and habitats associated with the water environment. For example, there is a risk of fish impingement and entrainment due to cooling water abstraction.

It is also noted in EN-7 that nuclear infrastructure development can impact on the natural functioning of water bodies in coastal, estuarine, riverine and lacustrine locations, with consequential impacts on erosion and other forms of landform change. These elements can affect a range of issues including water quality.

Assessment made in respect of EN-7

EN-7 sets out that early engagement on Development Consent and Environmental Permits should include consultation with the Environment Agency, Natural Resources Wales, Natural England, and the Marine Management Organisation where relevant, on any measures that will be required (potentially including evidence gathering by the applicant) to secure any relevant Environmental Permits and satisfy the requirements of any relevant Environmental Statement and Habitats Regulations Assessment. The applicant should also make early contact with relevant statutory bodies in Scotland and Northern Ireland where there is the potential for transboundary effects on water quality and resources.

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

EN-1 considers the potential effects on the water environment at length and it was assessed that there is potential for the majority of adverse effects on the water environment as a result of generating infrastructure development to be avoided, reduced and mitigated through careful design and planning. However, the long term significance of 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.

Of particular note, EN-1 sets out the requirements for an ES or equivalent, with detail provided on issues to be addressed, including discharges, effect on existing water resources and abstractions, the physical characteristics of the water body, impacts on water bodies, including those protected areas. Climate change should also be considered. In addition, note is made of the need to control run off and the need to control the risk of pollution.

EN-1 also notes the need for consideration of Water Framework Directive and Marine Strategy Regulations, as well as the interaction of the Project and Water Resource Management Plans and Shoreline Management Plans.

EN-7 also makes it clear that the characteristics of the proposed cooling system needs to be provided, along with the specific implications of this on the marine, estuarine, riverine, groundwater, lake and / or reservoir environments.

EN-7 also notes that in addition to mitigation outlined in EN-1, there is a need for designing any wet cooling system to minimise adverse impacts, such as through careful locating of water abstraction, and discharge (where applicable) points. EN-7 also considers aspects not directly related to the water environment such as entrainment of fish and sets out that the applicant should include within their application for Development Consent specific measures to minimise impacts to fish and aquatic biota by impingement and/or entrainment or by excessive heat or biocidal chemicals from discharges to receiving waters, where a wet cooling system is used.

EN-1 also provides information on effects of cooling water that would be of relevance to nuclear generation and notes 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.

Result in changes to groundwater distribution and flow?

Note is made in EN-7 that nuclear infrastructure can impact groundwater availability and quality and notes that the applicant's assessment should set out the characteristics of the cooling system proposed, and the specific implications of the proposal on marine, estuarine, riverine, groundwater, lake and/or reservoir environments.

There will be a need to ensure groundwater is protected during construction and operation of any nuclear facility – EN-7 notes the need to assess the potential impacts on water resources and quality, including the use of, and impact on, water bodies and resources during the construction, operation, decommissioning, and the storage of waste and spent fuel relating to the proposed nuclear infrastructure. EN-7 also sets out a range of requirements relating to radiological protection.

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

Note is made in EN-7 of a range of cooling systems. Some of these would require less water – EN-7 notes that the NPS seeks to include nuclear technologies which may have diverse cooling needs and water requirements. Essentially, depending on the technology deployed there may be less of a requirement for water – EN-7 clarifies this by noting that Nuclear infrastructure using a direct wet cooling system is likely to require a coastal, lacustrine or estuarine location, and in some cases a river (if the proposed design is less than 1000 MW) Infrastructure utilising a recirculating or hybrid system may be capable of deployment next to a large river or lake. Nuclear infrastructure utilising a dry cooling system may be capable of deployment away from any substantial water body.

Where abstraction is required, EN-1 sets out that to protect water resources, 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 place. The same approach is recommended by EN-1 for physical characteristics of water bodies.

Minimise the use of water resources / water consumption?

EN-7 notes that applicant should engage with relevant statutory bodies at an early planning stage to understand the steps they may have to take to secure Development Consent and Environmental Permits, and with relevant Water Companies on any potential impact on drinking water resources – it is anticipated this would include discussions on supply of potable water to what could be a significant workforce during construction, as well as the potential wider effects of nuclear development on drinking water sources (note EN-1 does note the need for consideration of source protection zones).

In addition to the requirements set out in EN-7, EN-1 also notes that the impact on local water resources can be minimised through planning and design for the efficient use of water, including water recycling. If an applicant 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?

Note is made in EN-7 that re-iterates and makes specific to nuclear, requirements set out in EN-1 that applicants must assess the impact of the construction, operation, decommissioning, and the storage of waste and spent fuel relating to the proposed nuclear infrastructure on coastal change and other landform change scenarios including riverine and lacustrine erosion and other risks due to being located near a lake, estuary or reservoir.

Reduce operational and accidental discharges to the water environment?

EN-1 notes 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. It is also to be noted that through EN-1, applicants 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, EN-1 encourages applicants to go beyond measures outlined in Water Resource Management Plans, by considering 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.

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, EN-1 indicates that there is a need to take account of relevant marine plans and conduct a marine plan assessment. Marine licencing requirements is also a noted issue and there is a clear requirement for consideration of the Water Framework Directive. EN-1 furthermore recognises that in coastal environments, the delivery of 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, EN-1 recommends that applicants should undertake coastal geomorphological and sediment transfer modelling where necessary. EN-7 notes that the EIA process can be an effective way of mitigating impacts.

Assessment conclusions and summary

Minor negative effects for water quality are likely as a result of the implementation of EN-7 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 proposed nuclear developments, for example through construction activities as well as the need for cooling water abstraction and discharge. Across all timescales, there is potential for the measures outlined above, along with statutory requirements and controls to mitigate these risks, though some adverse effects will remain. These could be significant during operation, particularly if the cooling system requires large volumes of water. The effects identified are uncertain as they will depend on the specific locations and scale of development. Should a dry cooling system be used adverse effects may be minor during operation, given the mitigation and controls outlined.

Table 7-7 – Protect and enhance water environment Objective Summary

AoS Objective 7: Protect and enhance the water environment	Assessment of technology specific effects (by timescale)		
	S	M	L
<p>Guide questions:</p> <ul style="list-style-type: none"> • 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? 	-	--	-

<ul style="list-style-type: none"> • Protect the quality of the seabed and its sediments, and avoid significant effects on seabed morphology and sediment transport processes? 			
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7.9: AoS Objective 8 Protect and enhance air quality on local, regional, national and international scale

Anticipated Effects

Enabling the development of nuclear energy infrastructure has the potential for a number of adverse effects on air quality. 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); and
- 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).

The construction of a nuclear power station is likely to have some localised adverse effects on air quality in the short term, including dust and emissions from construction vehicles, heavy goods vehicles (HGVs), and traffic movements generated by the construction workforce. This has the potential to affect residential properties along local access/haul routes in the immediate surrounding area as well as ecological receptors. AQMA may also be affected if they are in existence in the surrounding area. It is anticipated that effects on air quality can be minimised through good construction practices such as effective dust suppression, careful management of earthworks and a robust monitoring programme and the adherence to required consent/permits.

Operation is expected to generate emissions from plant / machinery and traffic which could potentially affect properties and ecological receptors. However, mitigation measures including promotion of sustainable transport (through robust transport planning) could successfully reduce emissions to acceptable levels. It is unlikely that such transport emissions will affect any AQMA or lead to the designation of new AQMA. In England, the release of radioactive emissions from a nuclear site will be governed by the Environment Agency through the development of appropriate discharge limits into the environment, as part of the authorisation under the Environmental Permitting (England and Wales) Regulations 2016. In Wales, the release of radioactive emissions from a nuclear site will be regulated by National Resources Wales through the development of appropriate discharge limits, as part of the authorisation under the Environmental Permitting (England and Wales) Regulations 2016. Planned radioactive discharges into the environment are thus highly controlled in both jurisdictions.

Similar effects on air quality from decommissioning to those during the construction phase are expected. However, emissions are anticipated to be lower than those during the construction

phase because of expected advances in zero emissions vehicles and machinery by the time decommissioning takes place together with the need for less earth movements and less transportation of materials off the site as compared to construction. Adherence to similar mitigation measures as during the construction phase would also reduce effects. There is, however, a large degree of uncertainty associated with this assessment, as at soonest decommissioning will start at the end of the XXI century.

Assessment made in respect of EN-7

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

EN-1 Section 5.2 Air Quality and Emissions notes that adverse effects may occur at all stages of energy infrastructure, 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. EN-1 recognises 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. EN-1 requires the 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. EN-1 further notes that mitigations on traffic and transport impacts will help mitigate the effects of air emissions from transport.

In addition, EN-1 notes 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. The AoS concludes that EN-1 makes commitments to minimise emissions released during all stages of the project.

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

EN-1 Section 5.2 Air Quality and Emissions identifies that applicants will be required to undertake an assessment of impacts of the proposed project on air quality as part of the Environmental Statement. EN-1 notes 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. 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 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 AoS therefore concludes that the NPS recognises 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

EN-1 Section 5.11 Land Use, Including Open Space, Green Infrastructure, and Green Belt notes the need for provision and enhancement of green infrastructure and that well designed and managed green and blue infrastructure can contribute to cleansing of pollutants among many other benefits. 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 AoS finds that EN-1 has recognised the importance of enhancing green infrastructure networks to improve air quality.

Assessment Conclusions and Summary

While EN-1 notes a robust approach to managing effects on air quality, it is anticipated that effect on air quality is still expected to be slightly adverse, due to the potential for emissions of air pollutants at all life stages of a nuclear power station. The construction of a nuclear power station is likely to have some localised adverse effects on air quality in the short term, including dust and emissions from construction vehicles, heavy goods vehicles (HGVs), and traffic movements generated by the construction workforce. This has the potential to affect residential properties along local access/haul routes in the immediate surrounding area as well as ecological receptors. It is anticipated that effects on air quality can be minimised through good construction practices such as effective dust suppression, careful management of earthworks and a robust monitoring programme and the adherence to required consent/permits. Operation is expected to generate emissions from plant / machinery and traffic which could potentially affect properties and ecological receptors. However, mitigation measures including promotion of sustainable transport (through robust transport planning) could successfully reduce emissions to acceptable levels. Similar effects on air quality from decommissioning to those during the construction phase are expected. However, emissions are anticipated to be lower than those during the construction phase because of expected advances in zero emissions

vehicles and machinery by the time decommissioning takes place together with the need for less earth movements and less transportation of materials off the site as compared to construction. Adherence to similar mitigation measures as during the construction phase would also reduce effects.

Table 7-8: Protect and enhance air quality on local, regional, national and international scale Objective Summary

AoS Objective 8: Protect and enhance air quality on local, regional, national and international scale	Assessment of technology specific effects (by timescale)		
	S	M	L
Guide questions: <ul style="list-style-type: none"> • 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? 	-	-	-

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

Anticipated Effects

Development of nuclear generation facilities has the potential to result in a loss of soil resources (including in those areas considered Best and Most Versatile) and lead to pollution or contamination of land. As well as loss, soil can also be damaged due to soil sealing and general soil degradation. Note that effects on soil can also have implications for other environmental topics such as biodiversity and the water environment.

Most effects, which can be direct, are likely to occur in the short term from the construction activities involved in developing new nuclear sites 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 medium to long term as a result of air and water pollution arising from construction or the operations of infrastructure or potentially as a result of spills during the operation of such developments. The decommissioning stage of 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 nuclear 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 infrastructure development. The significance of any effects will be dependent on the locations and scales of development.

Assessment made in respect of EN-7

EN-7 notes that the contamination of environmental features such as soils can be mitigated through the Environmental Impact Assessment (EIA) process and managed through the possible implementation of Environmental Management Plans. A key element of EN-1 is also the requirement for consideration of soils etc in an ES. This requirement would ensure that the direct, indirect, secondary, transboundary and short to long term effects of the development on soil quality will be considered, as these are requirements in The EIA Regulations.

Assist in facilitating the re-use of previously developed land; Seek to remediate contaminated land?

EN-1 notes that where contamination is present, applicants should consider opportunities for remediation where possible. This would help facilitate the use of brownfield land.

Avoid development upon the best and most versatile agricultural land?

EN-1 suggests 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), unless this would result in negative impacts on other sustainability considerations. For developments on previously

developed land, EN-1 requires that applicants should consider the risk posed by existing land contamination.

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

It is anticipated that the comprehensive measures set out in EN-1 would mean that the majority of adverse effects on soil resources as a result of developing new nuclear infrastructure could be avoided, reduced and mitigated through careful design and planning. For example, while there would inevitably be some loss of soil resource, effects can be minimised by good site selection, design and protection of soils during construction. EN-1 encourages applicants to develop and implement a Soil Management Plan as part of infrastructure proposals and this would also likely help to minimise potential land contamination. EN-1 also notes that where contamination is present, applicants should consider opportunities for remediation where possible. It should be noted though that in some nuclear facilities (or part of the facilities) there may be a design requirement to ensure soils are sealed from the potential for radiological contamination.

Minimise development (hardstanding) footprint to reduce soil sealing?

While EN-7 does not specifically note the issue of soil sealing, it does note that there is a need to consider soils through Environmental Impact Assessment and it is anticipated that this would address all potential impacts on soils directly or indirectly impacted by any development. It is anticipated this would include matters relating to soil sealing. The size of area of hardstanding would also be a factor considered in any assessment in respect of the water environment, with potential implications for water quality runoff (perhaps leading to pollution incidents, as well as greater flood risk in the locality, or downstream of a development).

Assessment conclusions and summary

Minor negative effects on soil resources are likely as a result of the implementation of EN-7 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 infrastructure. The effects identified are uncertain as they will depend on the specific nature, location and scale of development – loss of greenfield sites can be considered to be likely more significant than the re-use of brownfield / previously developed land.

The mitigation outlined in EN-7 (with reference to EN-1) has the potential to ensure that nuclear infrastructure development 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.

However, while it is considered that effects can be largely mitigated, the long term significance of these effects remains uncertain, as the effectiveness of the mitigation possibilities will depend on the individual sensitivities of the receiving sites, in the context of specific details of the development design, layout and operation.

Table 7-9: Protect soil resources and avoid land contamination Objective Summary

AoS Objective 9: Protect soil resources and avoid land contamination	Assessment of technology specific effects (by timescale)		
	S	M	L
<p>Guide questions:</p> <ul style="list-style-type: none"> • 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? 	-	-	-

7.11: AoS Objective 10: Protect, enhance and promote geodiversity

Anticipated Effects

Development of nuclear generating infrastructure has the potential to have a range of effects on geodiversity, depending upon the nature and scale of the infrastructure, as well as the location in which it is placed. Effects could include

- Disturbance to, or loss of, geologically important sites, for example from the digging of foundations, trenches, culverts, laying of pipes, cabling etc.
- 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. EN-7 notes that nuclear infrastructure using a direct wet cooling system is likely to require a coastal, lacustrine or estuarine location, and in some cases a river (if the proposed design is less than 1000 MW).
- Obstructions – from introduced structures presenting obstacles to access and study geodiversity assets

While effects are likely to be typically localised, they could be direct or indirect, as well as both temporary or permanent. Effects could also be experienced at superficial, as well as bedrock levels.

Assessment made in respect of EN-7

Protect and enhance geodiversity resource; Protect or enhance SSSIs designated for their geological interest; Avoid the degradation and removal, wherever possible, of RIGS?

EN-7 makes clear that there is a requirement to consider sites designated for the geology and / or their geological importance and ensure that effects have been assessed and appropriately mitigated (EN-1 notes that appropriate weight should be given to such sites). EN-7 also notes the requirement for early consultation and engagement with Environment Agency, Natural Resources Wales, Natural England, and the Marine Management Organisation where relevant, on any measures that will be required (potentially including evidence gathering by the applicant) to secure any relevant Environmental Permits and satisfy the requirements of any relevant Environmental Statement.

Protect geodiversity on the shoreline and marine waters?

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, EN-1 recommends that applicants should undertake coastal geomorphological and sediment transfer modelling where necessary. EN-7 also notes the importance of ensuring that risks from coastal processes and other landform change scenarios including riverine erosion and other risks due to being located near a lake, estuary or reservoir, to the nuclear infrastructure are manageable and demonstrate how the impacts will be managed to minimise adverse impacts on other parts of the coast. EN-7 notes the need for early consultation in respect of coastal processes. It is also noted that applicants should consider the relevant Marine Plans, Shoreline Management Plans and Coastal Change Management Areas (in Local Planning Authority local plans) and consider whether any activities would require a marine licence for the proposed location at an early stage if applicable. In addition, the applicant should consider existing knowledge of the risk of coastal erosion at any site located on the coast, historical coastal events in the region and the latest Shoreline Management Plan policy and National Coastal Erosion Risk Map. Marine Plans, River Basin Management Plans and capital programmes for maintaining flood and coastal defences and Coastal Change Management Areas should also be considered.

EN-7 also states that where a site for proposed nuclear infrastructure is located on the coast or an estuary, a river, a lake or a reservoir, the Secretary of State must be satisfied that the proposed site will not increase coastal erosion risk elsewhere and could be protected against coastal erosion and other landform change scenarios, including the potential effects of climate change, during construction, operation, decommissioning, and the storage of waste and spent fuel, taking into account, and placing substantial weight on, advice from the Office for Nuclear Regulation, the Marine Management Organisation, Environment Agency and/or Natural Resources Wales. Reference should also be made to Principles for Flood and Coastal Erosion Risk Management – July 2022 from the Environment Agency and the Office for Nuclear Regulation.

Support access to, interpretation and understanding of geodiversity?

Consideration of EN-1 shows that 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.

A key element of requirements is to include geodiversity in an Environmental Statement which ensures 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. This would allow identification of opportunities to support access to, interpretation and understanding of geodiversity.

EN-1 also sets out a range of mechanisms which could provide opportunities to identify how access etc can be improved – for example note is made of the need for a Geodiversity Management Strategy to preserve and enhance access to geological interest features, as part of relevant development proposals.

Assessment conclusions and summary

There is potential for 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. However, due to the potential for enhancement of geological features (or increasing access etc.) outlined in EN-1 and EN-7, there is also potential for minor positive effects in the medium to long term.

Nevertheless, it is important to note that 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.

Table 7-10: Protect, enhance and promote geodiversity Objective Summary

AoS Objective 10: Protect, enhance and promote geodiversity	Assessment of technology specific effects (by timescale)		
	S	M	L
<p>Guide questions:</p> <ul style="list-style-type: none"> • 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? 	-	-/+	-/+

7.12: AoS Objective 11 Improve health and wellbeing and safety for all citizens and reduce inequalities in health.

Anticipated Effects

Nuclear generation infrastructure has the potential to impact on the health and well being of the population at all stages – construction, operation and decommissioning. Effects could include:

- positive effects resulting from security and affordability of supply, and potential enhancements to employment and economic opportunities;
- potential significant negative impacts, in particular during construction phases (dust, noise, odour, vibration, artificial light, exposure to pollutants, smoke and steam, waste products and an increase in pest incidence);
- Loss of land that has value for recreation or which can enhance wellbeing – for example potential loss / diversion of walking routes such as the King Charles III England Coastal Path;
- 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 (including health or social care provision) and as noted in EN-7, increased demand on health monitoring services.

It is also recognised in EN-7, that radiation from nuclear infrastructure requires careful management during and beyond the operational life of the infrastructure.

Assessment made in respect of EN-7

Prevent accidental radioactive discharges or exposure to radiation, including interim storage of waste that may adversely affect the health of local communities?

EN-7 notes that the risk of an accident involving nuclear facilities is extremely unlikely and sets out a range of aspects which deal with that issue. For example, note is made that nuclear facilities are designed and operated with multiple safety systems in place, using a 'Defence in depth' approach.

It is also made clear in EN-7 that safety systems are / will be in place in the designs of nuclear infrastructure and compliance with the UK's robust legislative and regulatory regime means that the risk of radiological health detriment posed by nuclear infrastructure (both during normal operation and as a result of an unplanned release) is extremely small; radiation released by human activity, including nuclear energy generation, into the environment contributes to less than 0.2% of the dose to the UK population.

EN-7 notes that the applicant must adequately mitigate the risk to health and wellbeing, taking into account, and placing substantial weight on, advice from the Office for Nuclear Regulation and in compliance with their permitting and licensing requirements. In addition, it is noted in

EN-7 that the Secretary of State should act on the basis that the UK's strict legislative and regulatory regime (including the consideration of population density and characteristics as part of the site licensing process) will be properly applied and enforced to protect human health.

There are also other elements of legislative requirements in relation to protection from radiation that EN-7 notes. For example, it is set out that the Justification of Practices Involving Ionising Radiation Regulations 2004 (the Justification Regulations) requires the government to ensure that all new classes or types of practice resulting in exposure to ionising radiation are “justified” (by their economic, social or other benefits in relation to the health detriment they may cause) in advance of being first adopted or first approved.

EN-7 also sets out that there is an important role for regulators to play to ensure safety, security and protection of people and the environment in relation to the design, construction, operation and decommissioning of nuclear infrastructure and the transport of nuclear material. EN-7 notes the applicant should work with the local authority and the local integrated care system (in England) or the health board (in Wales) to identify any potentially significant health impacts and appropriate mitigation measures. Where such measures relate to better public information on the extent of risk in relation to radiological hazard, the applicant should consult the UK Health Security Agency on the appropriate standards for radiological protection.

Lead to concerns / perception of increased risk?

EN-7 sets out that risk will be extremely well managed from site selection, through each stage of construction, operation and decommissioning. While it is likely that some individuals would potentially still have concern, it is anticipated that the approach set out in EN-7 (and in EN-1) will address concerns / perception of risk, as per existing approach to nuclear generation.

EN-7 also sets out issues relating to major hazard sites and pipelines, with early engagement should include consultation with the Office for Nuclear Regulation and the Health and Safety Executive concerning a Nuclear Site Licence application and Hazardous Substance Consent. This engagement will assist the applicant with identifying any measures that will be required, potentially including evidence gathering by the applicant prior to their formal application for Development Consent and regulatory authorisations.

Minimise issues that can affect communities and their facilities including air, noise and light pollution, as well as vibration?

The construction (and decommissioning) phase of nuclear facilities is likely to have potential effects on communities, including through air, noise and light pollution, as well as vibration. These issues are largely addressed via EN-1 (for example through specific mitigation measures relating to noise), or through separate regulatory processes. For example, EN-1 recognises that those areas of generating 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. It is also noted that opportunities for improvement should be taken and this could include promoting local improvements to encourage health and wellbeing, this includes potential impacts on vulnerable groups within society i.e. those groups within society which may be differentially impacted by a development compared to wider society as a whole.

Other elements set out in EN-1 include assessment of nuisance and to show 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.

While EN-7 notes that operation of nuclear infrastructure is unlikely to be associated with significant noise, vibration or air quality impacts, it does acknowledge that there may be local impacts due to increased transport activities. EN-7 sets out a range of approaches to dealing with pollution. For example, note is made that applicants should also consider consulting with local authorities and the environmental health team if vehicle congestion might impact air quality. Similarly, it is noted that identification should be made of wildlife habitats that could be affected by traffic (e.g. emissions and noise) and implement reasonably practicable measures to mitigate this impact.

Result in the loss of recreational and amenity land or loss of access?

EN-7 recognises that there is a potential for loss of recreational land, effects on amenity and access etc., though it notes these are for the most part addressed via EN-1. EN-1 sets out a range of approaches to this issue. For example, it recognises that there is a risk to open space, countryside and coasts due to the need to locate infrastructure in these locations and it notes 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. 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.

EN-1 also recognises that developments may also deliver wider environmental gains and benefits to communities relevant to the local area and to national policy priorities, such as increased access to natural greenspace or the enhancement, expansion or provision of trees and woodlands. Note is also made of adequate provision of high quality open space (including green infrastructure). The scope of potential gains will be dependent on the type, scale, and location of specific projects.

In addition to the extensive approach set out in EN-1, EN-7 reiterates and encourages early engagement with authorities such as Natural England, Natural Resources Wales, any relevant National Park Authorities and relevant Local Authorities.

Provide for facilities that can promote more social interaction and a more active lifestyle and enjoyment of the countryside and coasts?

As noted, many of these issues are addressed via EN-1. For example, it recognises the need for access to and enjoyment of areas of greenspace and development of green infrastructure. These elements all allow for better social interaction, more active lifestyles, enjoyment of open areas and so on.

Promote initiatives that enhance safety and personal security for all?

EN-7 recognises that consideration of safety and security occurs at the earliest stages and for example notes that the size of the site directly impacts the safety, security, and operational efficiency of the infrastructure. EN-7 goes on to note various aspects of safety and notes the need for early engagement with safety bodies such as the Office for Nuclear Regulation and the Health and Safety Executive and clear note is made in EN-7 that as with other major energy infrastructure, the regulators play an important role in ensuring the safety, security and protection of people and the environment in relation to the design, construction, operation and decommissioning of nuclear infrastructure and the transport of nuclear material.

EN-7 also recognises that ensuring that the proposed nuclear infrastructure will be secure is vital and references EN-1 where such issues are considered in detail. For example, EN-1 sets out that national security considerations apply across all national infrastructure sectors and that close liaison is made 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). EN-1 further notes that 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.

Reduction of inequalities between different groups in society?

Clear recognition is made within both EN-7 and 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. Nuclear is a key element of this energy mix and will help to ensure that all groups have a secure and affordable supply.

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.

EN-7 (with reference to EN-1) also makes clear recognition of 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. Beneficial effects will be from the short through to the long term.

It is also made clear in EN-7 that safety systems are / will be in place in the designs of nuclear infrastructure and compliance with the UK’s robust legislative and regulatory regime means that the risk of radiological health detriment posed by nuclear infrastructure (both during normal operation and as a result of an unplanned release) is extremely small. EN-7 also notes that the risk of an accident involving nuclear facilities is extremely unlikely and sets out a range of aspects which deal with that issue. For example, note is made that nuclear facilities are designed and operated with multiple safety systems in place, using a ‘Defence in depth’ approach. As such, it is considered that any wider risk to health from development of nuclear generation is robustly addressed.

Table 7-11: Improve health and well-being Objective Summary

AoS Objective 11: Improve health and well-being and safety for all citizens and reduce inequalities in health	Assessment of technology specific effects (by timescale)		
	S	M	L
Guide questions: <ul style="list-style-type: none"> • Prevent accidental radioactive discharges or exposure to radiation, including interim storage of waste that may adversely affect the health of local communities? • Lead to concerns / perception of increased risk? • Minimise issues that can affect communities and their facilities including air, noise and light pollution, as well as vibration? • Result in the 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? • Reduction of inequalities between different groups in society? 	+	+	+

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

Anticipated Effects

Any large scale infrastructure project has the potential to impact transport networks and disrupt basic services. This would be particularly during the initial construction phases. Typical effects, which would also apply to nuclear infrastructure, would 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, vibration and atmospheric emissions from road transport;
- potential positive effects through new road facilities and transport links, upgrading of existing roads, enhanced public transport. This could include new sustainable transport modes.

In specific relation to nuclear facilities, there is a requirement to transport nuclear material in a safe and secure fashion.

Assessment made in respect of EN-7

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

EN-7 specifically notes the need for secure and efficient transportation routes for the delivery infrastructure components and staff during construction, the movement of staff, fuel, materials, waste and equipment during operation and decommissioning.

EN-7 makes specific note that applicants should consult Local Authorities, National Highways and Highways Authorities as appropriate and assess availability of transport infrastructure to support the construction, operation and decommissioning of the proposed nuclear infrastructure.

In addition, EN-7 sets out that applicants should assess any possible disruption which could include delays, closures, rerouting, and reduced capacity due to maintenance, construction, adverse weather conditions, or unexpected incidents to transport services and infrastructure (such as road, rail and airports). The applicant must also include within their proposals measures to ensure the proposed development will not have an unacceptable adverse impact on significant transport infrastructure, taking into account any local authority impact report.

EN-7 sets out detail on potential approaches to mitigation and notes that demand management measures must be considered. These could include:

- reduce the need to travel by consolidating trips,
- locate development in areas already accessible by active travel and public transport,

- provide opportunities for shared mobility,
- re-mode by shifting travel to a sustainable mode that is more beneficial to the network,
- retime travel outside of the known peak times,
- reroute to use parts of the network that are less busy, and
- identify wildlife habitats that could be affected by traffic (e.g. emissions and noise) and implement reasonably practicable measures to mitigate this impact.

In addition, EN-7 sets out that the applicant should prepare a travel plan including demand management and monitoring measures to mitigate transport impacts.

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

EN-1 sets out that transport assessments should be undertaken and it is expected this would include consideration of possible disruption to services and infrastructure. Travel plans (as required by both EN-1 and EN-7) would also address ensuring that services can be maintained.

Promote transportation of goods and people by low/zero carbon transport modes; Reduce travel distances to work and reduce the need for out commuting?

Travel plans (as required by both EN-1 and EN-7) would provide details of proposed measures to improve access by public transport, walking and cycling, to reduce the need for parking associated with the proposal and to mitigate transport impacts. Potential increased opportunities for employment / economic development in local areas (as a result of nuclear infrastructure development) would reduce the need for out commuting to other areas for work.

Assessment Conclusions and Summary

EN-7, supported by EN-1, provides 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 undertake transport assessment and include Travel Plans and this would help to ensure that all aspects of effect on the transport network can be achieved. As such, while it is anticipated that uncertain effects may be experienced in the short (construction) term, benefits should be experienced across the later timescale of the development.

Table 7-12: Promote sustainable transport Objective Summary

AoS Objective 12: Promote sustainable transport and minimise detrimental impacts on strategic transport network and disruption to basic services and infrastructure	Assessment of technology specific effects (by timescale)		
	S	M	L
<p>Guide questions:</p> <ul style="list-style-type: none"> • 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? • Reduce travel distances to work and need for out commuting 	-	+	+

7.14: AoS Objective 13 Promote a strong economy with opportunities for local communities

Anticipated Effects

The nuclear industry is a significant and important sector of the economy. As noted in EN-7, the existing programme of construction, operation and decommissioning of nuclear infrastructure provides significant socioeconomic benefits, with 83,000 people employed in the UK's civil and defence nuclear sectors in 2023. It is also anticipated that the next generation of nuclear facility – AMR and SMR, will lead to additional economic opportunities through enhanced capability in engineering and manufacturing through innovation, advanced techniques and new facilities. High-skilled manufacturing jobs for the future are considered to be crucial for underpinning the rollout of these new technologies in the UK, as well as putting the UK at the centre of the international programme of deployment. It is anticipated that effects would be at all scales – local, regional and national.

It is anticipated that nuclear generation facilities will require a range of skills to build, operate and decommission – many of these will be highly skilled and well paid. Nevertheless, in addition to beneficial effects, there is potential for adverse effects, particularly if large scale infrastructure is to be developed in rural areas where existing infrastructure, housing supply, health and social services and so on can be limited. Large scale engineering projects can also cause adverse effects on certain sectors such as the rural economy from loss of land, with potential further effects on food security or farm viability.

Assessment made in respect of EN-7

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

Clear recognition is made within both EN-7 and 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 and it is the role of the NPS to ensure this can happen by allowing applicants to bring forward proposals that balance generation capacity, cost and ensuring their projects are safe, deliverable and mitigate any adverse impacts from construction and operation. In specific reference to nuclear generation, EN-7 notes that nuclear energy provides an abundant, safe and reliable source of low carbon energy that will play a vital role in ensuring a secure, stable and affordable energy system for the future.

EN-1 notes 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. EN-7 expands on this by noting that applicants should engage with relevant statutory bodies at an early planning stage to understand the steps they may have to take to secure Development Consent. On socioeconomic impacts, this early engagement should include consultation with the Planning Inspectorate and relevant local authorities on how Good Design principles may enable the nuclear infrastructure to

maximise its positive contribution to the character and welfare of its host location and community. It is anticipated this would deal with specific issues of relevance to the local area, for example, in rural areas, impact on farming activities and the wider rural economy would be considered.

Support creation of both temporary and permanent jobs and increase skills, particularly in areas of need?

While it is anticipated nuclear generation will enhance job and skills opportunities (for example EN-7 notes that £24million has been invested into education, skills and employment on one project along), EN-1 provides greater clarity in this respect compared to EN-7. EN-1 notes 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 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 – it is anticipated that this would include for the provision of apprenticeships to local communities, though this is not explicitly stated. 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, EN-1 now states that the Secretary of State may wish to include a requirement that specifies the approval by the local authority of an employment and skills plan detailing arrangements to promote local employment and skills development opportunities, including apprenticeships, education, engagement with local schools and colleges and training programmes to be enacted. It is also noted 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.

In addition, EN-1 also notes 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 on tourism;

- 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. It is also anticipated that such assessment of cumulative effects would entail consideration of potential effects on discrete sectors such as the rural economy. Impacts to be addressed would be loss of land, farm viability, potential food security issues and so on.

Have wider socio-economic effects such as changes to the demographics, community services, house prices and land values?

EN-7 makes clear note that through the Environmental Impact Assessment and in consultation with the local authority, the applicant should identify at local and regional levels any socioeconomic impacts associated with the construction, operation and decommissioning of the proposed nuclear infrastructure. This assessment should demonstrate that the applicant has taken account of, amongst other things, potential pressures on local and regional resources, population change and economic benefits. It is anticipated such considerations would include community services, house prices and land values.

It is to be noted that the significant workforces required during construction of a nuclear facility (particularly large scale generation facilities) 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). It is anticipated that the measures set out in EN-1 (particularly through the Environmental Impact Assessment) would address those issues.

Have disproportionate effects on specific groups?

EN-1 recognises that opportunities should be taken to mitigate indirect impacts, including potential impacts on vulnerable groups within society and impacts on those protected characteristics under the Equality Act 2010, i.e. those groups which may be differentially impacted by a development compared to wider society as a whole.

Delivery of infrastructure to support economic investment in the local economy?

The NPS, through EN-7 supported by EN-1, will ensure that nuclear generation facilities can be developed in a manner that enables investment in local, regional and the national economy.

Assessment Conclusions and Summary

Development of new nuclear generating 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 less jobs during operation and then an increase during any decommissioning phase. A significant increase in workers can lead to stress on local housing and labour markets (particularly in more rural areas / smaller towns), however, EN-7, with reference to EN-1, sets 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 the NPS will 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 7-13: – Promote a strong economy Objective Summary

AoS Objective 13: Promote a strong economy with opportunities for local communities	Assessment of technology specific effects (by timescale)		
	S	M	L
<p>Guide questions:</p> <ul style="list-style-type: none"> • 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, house prices and land values? • Have disproportionate effects on specific groups? • Delivery of infrastructure to support economic investment in the local economy? 	-/+++	++	++

7.15: AoS Objective 14 Promote sustainable use of resources and natural assets

Anticipated Effects

All large infrastructure projects, including nuclear generation facilities, 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. There is also likely to be a loss of environmental aspects / resources such as soil, which can be considered finite.

Generation of low carbon energy offers potential for reducing the use of fossil fuels, either directly through the use of other fossil fuel powered generation, or through allowing transport to become electrified.

Assessment made in respect of EN-7

Provide for safe and secure interim storage of nuclear and other wastes where necessary?

It is important to recognise (as set out in EN-7) that most waste from nuclear infrastructure is low in radioactivity and can be disposed of safely in existing facilities such as conventional landfill sites and specialised near-surface disposal facilities, including the Low Level Waste Repository in Cumbria.

However, nuclear energy generation does produce specialist waste that requires a specific approach and this is set out in detail in EN-7. EN-7 notes that the interim storage of nuclear waste and spent nuclear fuel is covered by this National Policy Statement, but geological disposal facilities are not (these are addressed through a separate NPS). Due to concerns surrounding this issue, it is considered worthwhile for the AoS to note the approach to specialist waste at length – EN-1 deals with approaches to more general waste. Note that, assuming adequate provision for waste facilities are included as part of the development, the management of radioactive waste and spent nuclear fuel produced within the proposed infrastructure after it begins operating, including safe and secure transport and disposal, falls within the remit of the Nuclear Regulators, and outside of the scope of the Nationally Significant Infrastructure Project Development Consent regime.

EN-7 notes that nuclear infrastructure produces spent fuel and a range of different types of waste that will need to be managed in specific ways based on their type and the level of risk posed. This is the same as the approach taken for spent fuel and wastes from existing nuclear infrastructure. It is also noted in EN-7 that in May 2024, the UK Government and Devolved Administrations updated the policies on nuclear decommissioning and managing radioactive substances including the management of radioactive waste and spent fuel.

The remaining more hazardous waste, including spent nuclear fuel once it is declared as waste, is currently stored safely and securely in facilities around the country, and the UK Government has plans in place for a geological disposal facility to permanently dispose of this

waste. A process is underway to identify a suitable site for a geological disposal facility in England and Wales.

EN-7 notes that it is considered that the UK has robust legislative and regulatory systems in place for the management (including interim storage, disposal and transport) of radioactive waste. Through environmental permitting and nuclear site licensing, applicants will be required to demonstrate that spent fuel and the most hazardous radioactive waste arising from the operation of the nuclear infrastructure can be managed within the planned UK geological disposal facility. Applicants will also be required by environmental permitting and nuclear site licensing to demonstrate that there will be safe, secure and environmentally acceptable interim storage arrangements until a geological disposal facility can accept the waste.

Proposals for waste management facilities (such as interim storage facilities for waste and spent fuel prior to ultimate disposal in a geological disposal facility) that either form part of the development of the Nationally Significant Infrastructure Project or constitute “associated development” for the purposes of the Planning Act 2008 should be considered by the Secretary of State in the same way as the rest of the Nationally Significant Infrastructure Project using the principles and policies set out in EN-1, this National Policy Statement, the provisions of the Planning Act 2008 and other relevant principles and policies.

EN-7 provides further clarity that in the absence of an appropriate proposal for the interim storage of radioactive waste and spent fuel that is produced within the proposed nuclear infrastructure, the Secretary of State should require that:

- spent fuel is stored within the site of the proposed nuclear infrastructure until it has cooled sufficiently for disposal within the current and planned UK disposal facilities, including a geological disposal facility, and
- appropriate types of radioactive waste are stored within the site of the proposed nuclear infrastructure until it is appropriate to dispose it within the current and planned UK disposal facilities, including a geological disposal facility.

Reduce consumption of materials, energy and resources?

EN-7, with reference to EN-1, notes criteria for ‘Good Design’ and notes that applicants should determine the appropriate design principles for the project, based on consideration of Good Design principles. Consideration of Good Design principles at an early planning stage may significantly reduce cost, complexity and/or disruption at a later stage of delivery.

More specifically, EN-1 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.

Applicants are also encouraged through EN-1 to use construction best practices in relation to storing materials in an adequate and protected place on site to prevent waste, for example, from damage or vandalism. The use of Building Information Management tools (or similar) to record the materials used in construction can help to reduce waste in future decommissioning of facilities, by identifying materials that can be recycled or reused.

Promote sustainable waste management practices in line with the waste hierarchy?

EN-1 notes 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.

EN-1 also requires that all applicants should set out the arrangements that are proposed for managing any waste produced and prepare a Site Waste Management Plan. The arrangements described and Management Plan should include information on the proposed waste recovery and disposal system for all waste generated by the development, and 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. The applicant is encouraged to refer to the Waste Prevention Programme for England, and ‘Towards Zero Waste: Our Strategy for Wales’ and should seek to minimise the volume of waste produced and the volume of waste sent for disposal unless it can be demonstrated that this is the best overall environmental outcome. 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 as to the effectiveness of proposed waste management systems, including ensuring that the waste arisings will not have an adverse effect on waste facilities local to the development. Consideration will also be made of whether adequate steps have been taken to minimise volume of waste arisings and disposal. Waste management plans may need periodic review.

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; Promote the use of local suppliers that use sustainably-sourced and locally produced materials?

EN-1 notes that the UK is committed to moving towards a more circular economy and where possible, applicants are encouraged to source materials from recycled or reused sources and use low carbon materials, sustainable sources and local suppliers. Construction best practices should be used to ensure that material is reused or recycled onsite where possible.

Produce waste by-products that require appropriate management?

As noted, nuclear generation facilities produce most waste that is low in radioactivity and can be disposed of safely in existing facilities such as conventional landfill sites and specialised near-surface disposal facilities, including the Low Level Waste Repository in Cumbria. Nevertheless, there are also specialist waste streams that require careful handling and disposal. EN-7 sets out at length how this is to be done (see above), with geological disposal addressed through a separate NPS.

Assessment Conclusions and Summary

EN-7, supported by the approaches outlined in EN-1, provides 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 is also made in EN-1 of a number of key aspects such as the waste hierarchy, and the requirement 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.

EN-7 sets out at length how waste specific to the nuclear industry is to be managed. This notes that most waste from nuclear sites can be disposed of to conventional facilities or specialised near-surface disposal facilities. However, some waste will require special handling and disposal, potentially for a significant period of time after the nuclear facility has stopped generating power. This will be achieved via the current and any future approaches set by the relevant Nuclear Regulatory bodies, with ultimately a geological disposal facility being developed. Prior to that, EN-7 makes note that there will be a requirement to demonstrate that there will be safe, secure and environmentally acceptable interim storage arrangements.

Table 7-14: – Promote sustainable use of resources and natural assets Objective Summary

AoS Objective 14: Promote sustainable use of resources and natural assets	Assessment of technology specific effects (by timescale)		
	S	M	L
<p>Guide questions:</p> <ul style="list-style-type: none"> • Provide for safe and secure interim storage of nuclear and other wastes where necessary? • 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? 	-	0	-/+

<ul style="list-style-type: none">• Promote the use of low carbon materials and technologies?• Produce waste by-products that require appropriate management? <p>Promote the use of local suppliers that use sustainably-sourced and locally produced materials?</p>			
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8: Assessment of reasonable alternatives to NPS EN-7

8.1: 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*”.

As such, in line with the principles of good policy making and with the requirements of the SEA legislation, reasonable alternatives for implementing the aims of EN-7 need to be considered as part of the wider statutory AoS undertaken of EN-7 proposals.

The analysis of reasonable alternatives sets out a strategic context for the detailed assessment of the likely significant sustainability effects of the EN-7, as well as a means of evaluating such effects by comparing them with the effects of alternative ways of achieving the same wider nuclear energy policy objectives.

Note that the assessment of alternatives has focused on GW scale facilities as these are anticipated to have the greatest effect on sustainability. Where issues relating to SMR and AMR are of relevance, note is made.

8.2: Reasonable alternatives for EN-7

It is to be noted that when considering potential reasonable alternatives to EN-7, issues such as need for new nuclear power generation and need for a mix of nuclear technologies have been addressed and stated in Energy NPS EN-1. As such, these issues are considered to be ‘settled’ and no further alternatives are considered in this AoS. EN-1 clearly sets out the ‘need to transform the energy system, tackling emissions while continuing to ensure secure and reliable supply, and affordable bills for households and businesses. This includes increasing our supply of clean energy from renewables, nuclear and hydrogen manufactured using low carbon processes (low carbon hydrogen), and, where we still emit carbon, developing the industry and infrastructure to capture, transport and store it’. EN-1 sets out that the role of nuclear power could be fulfilled by large-scale nuclear fission, Small Modular Reactors, Advanced Modular Reactors, and fusion power plants.

In terms of risks to health and wellbeing from nuclear generation, there is a separate comprehensive and robust regulatory system involving ONR, EA, Health and Safety Executive that is outside of and independent to, the planning system which will ensure no new nuclear generation facility will pose any unacceptable risks to the health and wellbeing of the local

population under normal plant operating conditions. As such, no reasonable alternatives have been considered in this AoS. The UK government also collaborates with international bodies like the International Atomic Energy Agency (IAEA) and the International Commission on Radiological Protection (ICRP) to ensure good practices and safety standards. Further, multiple safety features within modern nuclear power plants along with legal requirements on operators of such plants make issues like an accidental release of radioactivity exceedingly unlikely. EN-7 expands upon the need for safety – for example it notes that nuclear facilities are designed and operated with multiple safety systems in place. To achieve optimum safety, nuclear plants operate using a 'Defence-in-Depth' approach. This approach prevents faults arising as far as reasonably practicable and, in the extremely unlikely event of an incident, it provides protection and mitigates any impacts.

No reasonable alternatives have been considered in this AoS for geological disposal of higher activity radioactive waste. The UK Government's policy position is that, before development consents for new nuclear power stations are granted, the government will need to be satisfied that effective arrangements exist or will exist to manage and dispose of the waste they will produce. Geological disposal has been identified as the most appropriate long-term solution for managing higher activity radioactive waste and a suitable location for a Geological Disposal Facility (GDF) will be identified through a consent-based process with government and its agencies working in partnership with communities. EN-7 expands upon this and notes that geological disposal facilities are not within the scope of this NPS as there will be a separate specific National Policy Statement dealing with all related issues.

Therefore, Government focussed on two key issues for the development of reasonable alternatives for EN-7 NPS:

- the level of protection provided to certain environmental assets in site selection; and
- the use of alternative cooling technologies to mitigate environmental impact.

As such, the following reasonable alternatives were set by the NPS making team for consideration through the AoS and testing against the AoS Objectives:

4. **NPS provides full protection to highest priority designated habitats** (SAC, SPA, MCZ, RAMSAR) – nuclear infrastructure development will not be granted DCO where it will inevitably (i.e. after reasonably practicable mitigations) cause residual harm to those sites.
5. **NPS provides full protection to highest priority designated landscapes and cultural sites** (national landscapes and heritage sites) – nuclear infrastructure development will not be granted DCO where it will inevitably (i.e. after reasonably practicable mitigations) cause harm to the visual character and cultural and/or historical significance of those sites.
6. **NPS specifies the use of alternative cooling technologies** to mitigate the environmental impact of nuclear power station cooling water abstraction and discharge, and the visual impact of natural draft cooling towers and steam plumes.

As EN-7 is the latest component in a wider energy NPS, it is considered appropriate to align assessment of the alternatives to EN-7 with the approach undertaken for EN-2 to EN-5. As such, the 14 AoS objectives have been grouped into 6 more appropriate headline sustainable development themes for the purpose of the alternatives appraisal as set out in Table 8-1 Use of these headline sustainable development themes allows the appraisal to better keep at a higher and strategic level and comparable to the assessments made of EN-2 to EN-5.

Table 8-1: Sustainable Development (SD) Theme and AoS Objectives

Headline SD Themes	AoS/SEA Objectives (numbers refer to AoS objectives)
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); Landscapes and Townscapes (6)
The Natural Environment	Adaptation and Resilience (2), Biodiversity (3 & 4), Heritage (5), Landscapes and Townscapes (6), Water (7), Soils (9), Geodiversity (10)

As with EN-2 to EN-5, to draw comparison between the alternatives and EN-7 on a broad level, the following scale has been used.

Table 8-2: Differentiator scale for Alternatives

Scale	Description
Large Positive	A materially different positive outcome is anticipated compared to EN-7
Positive	A more positive outcome is anticipated compared to EN-7
Neutral	This alternative is anticipated to have the same outcome as EN-7

Negative	A more adverse outcome is anticipated compared to EN-7
Large Negative	A materially different adverse outcome is anticipated compared to EN-7

8.3 Results of Appraisal of Alternatives to EN-7

The findings of the appraisal of the strategic alternatives for EN-7 are set out below.

Alternative 1

In relation to the highest priority designated habitats (SAC, SPA, MCZ, RAMSAR), the approach taken by EN-7 means that DCO may be granted even though there is significant residual harm to those Habitat sites. Alternative 1 would provide full protection in relation to the same sites from residual harm through not allowing derogations.

In respect of climate change, it is considered this alternative would allow for better protection of Habitats sites than EN-7, including those which would have particular importance for sequestration of carbon (e.g. peat bogs, forests, grasslands, parts of the marine environment etc.). As such, it is considered inclusion of this alternative would have a Positive effect in respect of Climate change (Net Zero) targets.

However, in terms of security of energy supply, it is considered that an alternative provides full protection in respect of Habitats sites could potentially reduce the availability of otherwise suitable nuclear sites and reduce the likelihood of the UK meeting targets related to domestic low carbon energy generating capacity, as compared to EN-7. Restricting the potential for development could also reduce the overall economic output of the UK. As such, it is considered inclusion of this alternative would have a Negative effect in respect of security of energy supply.

Positive benefits could be anticipated from this alternative in respect of health and wellbeing as compared to EN-7. Such Habitats sites protect and maintain areas of the most valuable habitat, which, in addition to being of critical importance to biodiversity, are recognised as having health and wellbeing benefits to people through allowing access to nature and performing air and water pollution cleansing.

In economic terms, it is considered that this alternative could result in areas being excluded from potential nuclear infrastructure development as compared to EN-7. This could potentially reduce the availability of otherwise suitable sites. Such areas could lose out on economic benefits that would be anticipated from the development of nuclear infrastructure (well paid job opportunities, opportunities for suppliers etc.). As such, it is considered inclusion of this alternative would have a Negative effect in respect of the economy.

It is considered that this alternative would have no strategic implications for the built environment – the Habitat sites noted in this alternative relate to those sites designated at the highest level (European / International) for nature conservation. As such, it is considered inclusion of this alternative would have a Neutral effect in respect of the built environment in comparison to EN-7.

This alternative would provide for better protection for the Habitats sites as nuclear infrastructure development will not be granted be granted DCO where it will inevitably (i.e. after reasonably practicable mitigations) cause residual harm to those sites. As such, by protecting such areas, it is considered inclusion of this alternative would have a Large Positive effect in respect of the natural environment in comparison to EN-7.

Sustainable development theme	Alternative 1
Climate Change (Net Zero)	Positive
Security of Energy Supply	Negative
Health and Wellbeing	Positive
The economy	Negative
The built environment	Neutral
The natural environment	Large Positive

Alternative 2

In relation to the highest priority designated landscapes and cultural sites (national landscapes and heritage sites), the approach taken by EN-7 means that DCO may be granted where it will inevitably (i.e. after reasonably practicable mitigations) cause harm to the visual character and cultural and/or historical significance of those sites. Alternative 2 would provide full protection in relation to the same landscapes and cultural sites.

In relation to climate change, it is considered that this alternative allows for better protection for sites that, in addition to being National Landscapes, could include areas of importance for sequestration of carbon (e.g. peat bogs, forests, grasslands). As such, it is considered inclusion of this alternative would have a Positive effect in respect of Climate change (Net Zero) targets in comparison to EN-7.

However, this alternative could result in areas being excluded from potential nuclear infrastructure development. This could potentially reduce the availability of otherwise suitable sites and reduce the likelihood of the UK meeting targets related to domestic low carbon energy generating capacity. Restricting the potential for development could also reduce the overall economic output of the UK. As such, it is considered inclusion of this alternative would have a Negative effect in respect of security of energy supply as compared to EN-7.

In respect of health and wellbeing, it is considered that this alternative could result in protection of sites which would have benefits in terms of health and wellbeing. In short, such designated sites protect and maintain areas / features that can provide a ‘sense of place’ for people, as well as a connection to their heritage – this is widely recognised as having positive wellbeing effects. As such, it is considered that this alternative would have a Positive effect in respect of health and wellbeing.

In economic terms, it is considered that this alternative could result in areas being excluded from potential nuclear infrastructure development. This could potentially reduce the availability of otherwise suitable sites. Such areas could lose out on economic benefits that would be anticipated from the development of nuclear infrastructure (well paid job opportunities, opportunities for suppliers etc.). As such, it is considered inclusion of this alternative would have a Negative effect in respect of the economy in comparison to EN-7.

The built environment plays a key role in landscape and cultural sites. As such, an alternative which results in removing the potential for nuclear infrastructure development in those areas considered highest priority designated landscapes, or cultural sites would likely be significantly beneficial in ensuring that the quality and setting of such features is maintained. As such, it is considered inclusion of this alternative would have a Large Positive effect on the built environment as compared to EN-7.

This alternative is focused on highest priority designated landscapes (national landscapes) and cultural sites and it is to be recognised that such areas play an important role in maintaining the natural environment, by restricting development that is not appropriate to the scale or context of the area. As such, by protecting such areas, it is considered inclusion of this alternative would have a Positive effect in respect of the natural environment as compared to EN-7.

Sustainable development theme	Alternative 2
Climate Change (Net Zero)	Positive
Security of Energy Supply	Negative
Health and Wellbeing	Positive
The economy	Negative

The built environment	Large Positive
The natural environment	Positive

Alternative 3

EN-7 promotes a range of cooling technologies which include direct wet cooling, indirect wet cooling, dry cooling and hybrid cooling. Alternative 3 excludes direct wet and indirect cooling from the mix of cooling technologies.

In terms of climate change, it is considered that this alternative would have no implications in comparison to EN-7. It is anticipated that all nuclear generating stations will produce energy in line with net zero targets, no matter the specific technical detail of how they are cooled. As such, it is considered inclusion of this alternative would have a Neutral effect in respect of climate change.

It is also considered that this alternative would not allow the full range of potential sites as set out in EN-7 to be utilised, with areas being effectively excluded from potential nuclear infrastructure development and as such would reduce the availability of otherwise suitable sites and reduce the likelihood of the UK meeting targets related to domestic low carbon energy generating capacity. As such, it is considered this alternative would have no implications in comparison to EN-7 and this alternative would have a Negative effect in respect of security of energy supply.

In terms of health and wellbeing, it is considered that this alternative would have no implications – it is anticipated that all cooling technologies will be operated in a manner which protects health of the local and wider population. As such, it is considered inclusion of this alternative would have a Neutral effect in respect of health and wellbeing.

In economic terms, it is considered that this alternative could result in less sites being potentially viable for the development of nuclear generating infrastructure with a result that some areas could lose out on economic benefits that would be anticipated from such development. As such, it is considered inclusion of this alternative would have a Negative effect on the economy in comparison to EN-7.

A range of alternative cooling technologies would potentially allow for consideration of greater / more effective mitigation of effects on those areas of landscape value – i.e. some cooling technologies would allow for the removal of cooling towers, with beneficial effects on landscape. Similarly, this could better protect the setting of some cultural heritage assets. As such, it is considered inclusion of this alternative would have a Large Positive effect on the built environment.

Use of alternative cooling technologies would allow for a greater range of locations to be considered for the development of nuclear infrastructure, including areas which may have less

environmental features of interest and thus lead to lower impacts. Alternative cooling technologies could mean that some pressures on the natural environment can be reduced or avoided. Such cooling technologies would have less requirement, or no requirement, to abstract or discharge large volumes of water therefore resulting in less or no impacts on receiving waters quantity and quality and on aquatic biodiversity. As such, it is considered that the use of alternative cooling technologies would allow for Potential Large positive effects on the natural environment to be realised.

Sustainable development theme	Alternative 3
Climate Change (Net Zero)	Neutral
Security of Energy Supply	Negative
Health and Wellbeing	Neutral
The economy	Negative
The built environment	Large Positive
The natural environment	Large Positive

None of these alternatives are as good as, or better than, the proposals set out in EN-7 and therefore the government’s preferred option is to take forward the new nuclear EN-7. Note that the British Energy Security Strategy emphasises the importance of addressing underlying vulnerability to international energy prices by reducing dependence on imported oil and gas, and accelerating deployment of nuclear, other energy technologies and related network infrastructure. EN-7 is part of a suite of approaches that reflect these wider requirements by introducing greater flexibility in energy infrastructure provision at the national level.

9: Cumulative and transboundary effects

9.1: Introduction

It is a requirement to consider cumulative, synergistic and indirect effects of implementation of EN-7. Secondary and indirect effects are effects that are not a direct result of the implementation of EN-7, 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 EN-7, 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. The identification of these effects already takes into account the fact that earlier recommendations have taken on board to improve the sustainability performance of EN-7.

9.1: Cumulative effects with other energy NSIP

Due to the close linkages between EN-7 and the other elements of the wider Energy NPS (in particular EN-1), it is important to note that cumulative effects could occur through any aspect of energy NSIP development and not just nuclear NSIP. As such, it is important to consider the potential for cumulative effects for the wider NPS as a whole and not just for EN-7.

Previous consideration of EN-1 to EN-5 showed that a key element to the wider NPS was recognition of the need to reduce GHG emissions in order to help combat climate change. It was shown that the NPS had a key focus for low or net zero carbon energy generation and transmission. The development of new nuclear generating infrastructure would be aligned with this approach to low carbon energy generation (notwithstanding issues relating to embodied carbon in infrastructure construction) and result in positive cumulative effects on GHG emissions.

The issue of clustering of installations was also addressed as part of the consideration of EN-1 and it was noted that there could be both beneficial and negative effects with this aspect. An example was given of how if there were a number of projects being developed within a region and in a similar timeframe, it can affect local economies and labour supply markets, as well as drive up demand for housing and accommodation as well as local services. This could also lead to a shortage of skilled workers in a local area. On the other hand, it was considered that 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 the case that, due to the typical

scale of nuclear generation facilities (particularly large GW scale facilities), these issues would also be relevant to the development of new nuclear facilities.

New nuclear generation, alongside wider energy NSIP development, is also considered to provide cumulative benefit to the population as a whole by helping to ensure certainty of investment and security of energy supplies.

There are also likely to be cumulative effects on the environment and these can be anticipated to be cumulatively greatest and more significant when infrastructure (nuclear or otherwise) is clustered. As with all effects set out across EN-7, the particular significance would depend on precise location, scale, technology to be deployed and the environmental context of the area. In specific relation to nuclear generating infrastructure, the location chosen has frequently been areas that are also notable for landscape such as open areas of coastline, though the future use of smaller sites for SMR and AMR technologies (as opposed to 1GW scale) may allow such effects to be reduced, or for a greater range of locations to be considered. However, these new 'smaller' technologies may also allow for multiple reactors to be placed in one area, with potential for other cumulative effects. Aspects such as these are set out in detail in EN-7 which notes a range of potential impacts of multiple reactors.

In addition to new approaches with implications for landscape, such new technologies may also allow for new approaches in terms of cooling water or discharge requirements, which can act to reduce the significance of effect across a range of environmental topics. Consideration would need to be given to striking a balance between environmental effects and other requirements in choosing the particular approach to be taken and EN-7 sets out this requirement. For example, EN-7 notes that if an applicant wishes to secure a Development Consent Order providing for multiple phases of nuclear infrastructure development, the applicant must ensure each phase meets the expectations set out in EN-7 and other relevant National Policy Statements, along with any relevant legal and regulatory requirements. This will involve articulating the benefits and impacts of each phase of development, and how those impacts will be mitigated.

EN-7 goes on to note that as is the case with any application for Development Consent, cumulative impacts will also be taken into account where relevant.

Nevertheless, it can be anticipated that no matter what technology or approach is taken, there will still likely be cumulative effects. Across all energy technologies it was considered that cumulative effects of construction (e.g. air quality, dust, noise, visual, traffic, socio-economic etc.) may arise and may be difficult to mitigate (again depending on precise scheme parameters). As such, the NPS as a whole (including EN-7) places a 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.

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 precise

nuclear infrastructure project proposed and the sensitivity of the receiving communities and environment. EN-7 (supported by EN-1) though sets out a series of approaches that will address and manage these issues.

Nevertheless, it is important to recognise 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.

9.2: Cumulative effects in-combination with other projects, plans and policies

Cumulative effects can also arise due to effects from the energy NPSs combining with effects from other projects, plans and policies (PPPs) in various sectors. However, due to the strategic and high level nature of EN-7 and the lack of any locational and specific detail on any nuclear 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 EN-7 and any subsequent nuclear 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.

The type of PPPs that could have cumulative or in-combination effects with infrastructure developed under EN-7 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):

- Resilience to climate change
- Noise, vibration and light disturbance
- Air, land and water pollution
- Changes to water quantity / flow and coastal change

- Landscape
- Species injury and mortality
- Changes in habitat extent, composition and structure
- Health and Wellbeing
- Sustainable transport; and
- 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 are not nuclear or general energy infrastructure development, as well as 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. Effects could also take place at all phases – construction, operation and decommissioning.

Application of the approach to CNP could also result in cumulative effects with other projects, plans and policies, though again the scale and nature of such effects cannot be known at this stage.

In summary, in order to fully understand the potential for and likely extent of cumulative effects, details of when nuclear NSIPs will be developed, as well as details of the precise location and technology to be used, would need to be known for both the proposed nuclear infrastructure development, as well as other developments. Note that both EN-1 and EN-7 require the undertaking of Environmental Impact Assessment for relevant energy infrastructure schemes. Consideration of cumulative effects is a requirement of EIA and as such, the potential for cumulative effects (in light of the particular circumstances of the development) would be considered through that mechanism. Similarly, other development types (potentially outside the energy sector) would also be subject to the EIA Regulations and would, as a matter of course, consider the potential for cumulative effects between that development and any nuclear energy infrastructure.

9.3: Transboundary effects

Potential transboundary effects from the implementation of EN-7 have been 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.

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 result 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.

It is worth noting that EN-7 considers the potential for transboundary effects and notes that applicants should make early contact with relevant statutory bodies in Scotland and Northern Ireland where there is the potential for transboundary effects on biodiversity and geological conservation, as well as water quality and resources.

It is also worth noting that EN-7 (supported by EN-1) places a strong emphasis on the need for applicants to undertake an Environmental Impact Assessment. The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 ('the EIA Regulations'), require transboundary effects to be considered from any development subject to these regulations.

As such, it is considered that Ireland, France, Belgium, Germany, Denmark, Sweden and the Netherlands would be consulted on the potential for significant environmental effect from implementation of any relevant scheme that falls under EN-7 and is subject to the EIA Regulations (in England and Wales). The particular nation state(s) to be consulted would be dependent on the proposed technology and location.

EN-1 notes that 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. As such, while outside the requirements of the EIA Regulations, it is considered that due to these requirements of EN-1, when required, consultation would also take place with Norway and the Crown Dependencies of the Isle of Man and the Channel Islands.

10: Monitoring

Monitoring helps to examine the effects predicted through the AoS process against the actual effects of EN-7 when implemented. It is also a requirement of the SEA Regulations to describe the measures envisaged concerning how significant effects of implementing EN-7 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 Guidance¹² 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 ideally 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 text within EN-7 (bolstered by that within EN-1 and the wider NPS) provides robust policy to address issues, the non-specific spatial nature of EN-7 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.

The sustainability effects of EN-7 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 bodies such as UK Health Security Agency and Office for Health Improvement and Disparities.

Local Planning Authorities monitor the effectiveness of their spatial plans, including indicators such as employment and access to community facilities and services. Nationally, Government¹³ 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).

It is also the case that nuclear generating activities will be monitored through the nuclear licensing procedures. EN-7 also recognises that nuclear facilities could increase demand on health monitoring services and notes the need for close engagement with bodies such as the Health and Safety Executive and the Office for Nuclear Regulation.

¹² Practical Guide to the Strategic Environmental Assessment Directive (ODPM, September 2005)

¹³ Defra national SD indicators <http://www.defra.gov.uk/sustainable/government/progress/national/index.htm>

As such, there is a large body of evidence that can be drawn upon to inform implementation of EN-7 and help inform any future review. The following sets out some key elements in respect of particular Objectives noted in this AoS.

No.	AoS Objective against which a significant effect has been predicted	Monitoring Measure / Indicator	Target	Data Source	Suggested frequency of monitoring	Responsibility for undertaking monitoring
1	Consistent with the national target of reducing carbon emissions to net zero by 2050	CO2 emissions from Nuclear sector (by source)	Reduce to pathway consistent with Net Zero targets	DESNZ: UK greenhouse gas emissions national statistics	Annual	DESNZ
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 Nuclear infrastructure schemes	Zero	Environment Agency, Local Authorities and Nuclear infrastructure scheme developers (in respect of individual projects)	Annual	Nuclear infrastructure scheme developers (in respect of individual projects) – reporting to DESNZ
		Number of new Nuclear infrastructure schemes designed for successful adaptation to climate change	All	Environment Agency, Local Authorities and Nuclear infrastructure scheme developers	Annual	Nuclear infrastructure scheme developers (in respect of individual projects)

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No.	AoS Objective against which a significant effect has been predicted	Monitoring Measure / Indicator	Target	Data Source	Suggested frequency of monitoring	Responsibility for undertaking monitoring
				(in respect of individual projects)		– reporting to DESNZ
		Number of new Nuclear infrastructure schemes designed to include best practice SuDS (where appropriate) and / or upstream Natural Flood Management	Increase	Environment Agency, Local Authorities and Nuclear infrastructure scheme developers (in respect of individual projects)	Annual	Nuclear infrastructure scheme developers (in respect of individual projects) – reporting to DESNZ
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 Nuclear infrastructure schemes	Increase in Biodiversity Net Gain	Natural England, Local Authorities and Nuclear infrastructure scheme developers (in respect of individual projects)	Annual	Nuclear infrastructure scheme developers (in respect of individual projects) – reporting to DESNZ
		Number of Nuclear infrastructure schemes with overall adverse impact on sites	Year on year decrease	Natural England, Local Authorities and Nuclear infrastructure	Annual	Natural England, Local Authorities and Nuclear infrastructure

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No.	AoS Objective against which a significant effect has been predicted	Monitoring Measure / Indicator	Target	Data Source	Suggested frequency of monitoring	Responsibility for undertaking monitoring
		designated for nature conservation		scheme developers (in respect of individual projects)		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, Local Authorities and Nuclear infrastructure scheme developers (in respect of individual projects)	Annual	Natural England, Local Authorities and Nuclear infrastructure scheme developers (in respect of individual projects)
		Area of Green Infrastructure created by Nuclear infrastructure schemes	Year on year increase in area (ha)	Natural England, Local Authorities and Nuclear infrastructure scheme developers (in respect of individual projects)	Annual	Natural England, Local Authorities and Nuclear infrastructure scheme developers (in respect of individual projects)

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No.	AoS Objective against which a significant effect has been predicted	Monitoring Measure / Indicator	Target	Data Source	Suggested frequency of monitoring	Responsibility for undertaking monitoring
4	Protect and enhance sites designated for their international importance for nature conservation purposes (linked to separate HRA process for EN-7)	Condition of International and or European Sites	Year on year increase in improvement	Natural England, Local Authorities and Nuclear infrastructure scheme developers (in respect of individual projects)	Annual	Natural England, Local Authorities and Nuclear infrastructure scheme developers (in respect of individual projects)
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	Natural England, Local Authorities and Nuclear infrastructure scheme developers (in respect of individual projects)	Annual	DESNZ

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No.	AoS Objective against which a significant effect has been predicted	Monitoring Measure / Indicator	Target	Data Source	Suggested frequency of monitoring	Responsibility for undertaking monitoring
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 attributable to the Nuclear sector	Reduction in direct impacts	Natural England, National Parks and AONB Management Groups, Environment Agency and Nuclear infrastructure scheme developers (in respect of individual projects)	Annual	DESNZ
		Changes in settings and views attributable to the Nuclear sector	Reduction in direct impacts	Natural England, National Parks and National Landscape Management Groups, Environment Agency and Nuclear infrastructure scheme developers (in respect of individual projects)	Annual	DESNZ

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No.	AoS Objective against which a significant effect has been predicted	Monitoring Measure / Indicator	Target	Data Source	Suggested frequency of monitoring	Responsibility for undertaking monitoring
7	Protect and enhance the water environment	Number of water pollution incidents attributable to the Nuclear sector (across all waterbodies)	Zero	Environment Agency, Local Authorities and Nuclear infrastructure scheme developers (in respect of individual projects)	Annual	Nuclear infrastructure scheme developers and Operators (in respect of individual projects / facilities) – reporting to DESNZ
8	Protect and enhance air quality on local, regional, national and international scale	Exceedances of Air Quality Objectives or limit values	Zero	DEFRA / Environment Agency, Local Authorities and Nuclear infrastructure scheme developers and Operators (in respect of individual projects)	Annual	Nuclear infrastructure scheme developers and Operators (in respect of individual projects / facilities) – reporting to DESNZ
9	Protect soil resources, promote use of	Area (in hectares) of best and most versatile land (BVAL) (grades 1,2 or 3a)	Year-on-year reduction in the area of BVAL	Local Authorities and Nuclear infrastructure	Annual	Nuclear infrastructure scheme

No.	AoS Objective against which a significant effect has been predicted	Monitoring Measure / Indicator	Target	Data Source	Suggested frequency of monitoring	Responsibility for undertaking monitoring
	brownfield land and avoid land contamination	included within or impacted by new Nuclear infrastructure schemes	within or impacted by new Nuclear infrastructure schemes subject to loss or degraded quality.	scheme developers (in respect of individual projects)		developers and Operators (in respect of individual projects / facilities) – reporting to DESNZ
		Area (in hectares) of previously contaminated land included within or impacted by new Nuclear infrastructure schemes	100% of previously contaminated land covered by new Nuclear infrastructure schemes subject to decontamination measures	Local Authorities and Nuclear infrastructure scheme developers (in respect of individual projects)	Annual	Nuclear infrastructure scheme developers and Operators (in respect of individual projects / facilities) – reporting to DESNZ
10	Protect, enhance and promote geodiversity	Area (in hectares) of designated geodiversity sites (RIGS and / or SSSIs) included within or	100% of designated geodiversity sites retained at their current condition or subject to	Local Authorities and Nuclear infrastructure scheme developers	Annual (subject to data availability)	DESNZ

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No.	AoS Objective against which a significant effect has been predicted	Monitoring Measure / Indicator	Target	Data Source	Suggested frequency of monitoring	Responsibility for undertaking monitoring
		impacted by Nuclear infrastructure schemes	improvement in their condition Year-on-year deduction in the % of geodiversity sites within or impacted by Nuclear infrastructure schemes subject to loss or degraded condition.	(in respect of individual projects)		
11	Improve health and well-being and safety for all citizens and reduce inequalities in health	Households living in fuel poverty in areas of new Nuclear infrastructure schemes	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

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No.	AoS Objective against which a significant effect has been predicted	Monitoring Measure / Indicator	Target	Data Source	Suggested frequency of monitoring	Responsibility for undertaking monitoring
12	Promote sustainable transport and minimise detrimental impacts on strategic transport network and disruption to basic services and infrastructure	Proportion of new Nuclear infrastructure schemes with Transport Management Plans that emphasise sustainable transport modes including public and active travel	100% of new Nuclear infrastructure scheme	Local Authorities and Nuclear infrastructure scheme developers (in respect of individual projects)	Annual	Nuclear infrastructure scheme developers and Operators (in respect of individual projects / facilities) – reporting to DESNZ
13	Promote a strong economy with opportunities for local communities	GVA per capita and percentage change in employment in areas of new Nuclear infrastructure schemes	Increase	NOMIS / Office for National Statistics	Annual	DESNZ supported by relevant authorities
14	Promote sustainable use of resources and natural assets	Proportion of construction materials used in new Nuclear infrastructure schemes derived from alternative secondary and / or recycled sources.	100% of Nuclear infrastructure scheme employing reuse, recovery and recycling	Local Authorities and Nuclear infrastructure scheme developers (in respect of individual projects)	Annual	Nuclear infrastructure scheme developers and Operators (in respect of individual projects)

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No.	AoS Objective against which a significant effect has been predicted	Monitoring Measure / Indicator	Target	Data Source	Suggested frequency of monitoring	Responsibility for undertaking monitoring
			practices during construction			/ facilities) – reporting to DESNZ
		Proportion (by mass) of waste arising associated with new Nuclear infrastructure schemes which is reused or recycled	Year-on-year increase in % of waste materials generated during construction being reused on-site	Local Authorities and Nuclear infrastructure scheme developers (in respect of individual projects)	Annual	Nuclear infrastructure scheme developers and Operators (in respect of individual projects / facilities) – reporting to DESNZ

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