DEPARTMENT OF ENERGY & CLIMATE CHANGE

Appraisal of Sustainability for the revised draft National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines Infrastructure (EN-4)

Planning For New Energy Infrastructure

October 2010

Preface

This document is the Appraisal of Sustainability report (AoS) for the draft energy National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4). EN-4 is one of a suite of National Policy Statements (NPSs) which the Government intends should form the basis for decision-making on development consent for a new generation of large-scale energy infrastructure. EN-4 is one of five energy NPSs covering specific technologies, such as nuclear power or electricity networks: each of these should be read in conjunction with the Overarching Energy National Policy Statement (EN-1), which deals with matters common to all new large-scale energy infrastructure and sets out certain policies which apply to more than one type of energy infrastructure.

The main function of this report is to set out the likely significant effects on the environment of developing new renewable energy infrastructure of the types, and on the scale, envisaged by EN-1 and EN-4, as well as indicating how the policies set out in EN-4 are consistent with the principles of sustainable development more generally.

The AoSs are designed to inform the consultation on the revised drafts of the energy NPSs with which they are being published. If you have any comments on them, please respond as part of the re-consultation on the revised draft energy NPSs. The documents are available at: www.energynpsconsultation.decc.gov.uk. The re-consultation will run from 18th October 2010 to 24th January 2011.

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1. Introduction

1.1. Context

This is the revised Appraisal of Sustainability (AoS) report for the National Policy Statement (NPS) on Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4). NPSs are made under the Planning Act 2008. The Act requires AoSs to be prepared for NPSs. The introduction to the AoS of the Overarching Energy National Policy Statement (EN-1) contains a general explanation of the relationship between the Planning Act 2008 and UK energy policy, and the functions of NPSs and AoSs.

This Report provides information on the:

- NPS for Gas Supply Infrastructure and Gas and Oil Pipelines (Section 1);
- alternatives considered (Section 1);
- findings of the Appraisal of Sustainability (AoS) (Section 2); and
- proposed measures for monitoring significant effects (Section 4).

This report should be read in conjunction with the revised AoS report for EN-1 which provides information on the:

- suite of six energy NPSs (EN-1 to EN-6) (Section 2);
- methodology (including when the AoS was undertaken and by whom) (Section 2);
- scope of the appraisal (Section 2);
- method for collecting and presenting baseline information (Section 2);
- approach to completing the appraisal (including the AoS Framework with objectives for sustainability), assumptions and difficulties encountered during the appraisal (Section 2);
- assessment of alternatives (Section 3);
- overall appraisal of the NPS policies (Section 4); and
- monitoring proposals and next steps (Section 5).

Paragraph 2.6.1 of AoS 1 explains how the significance of likely effects is shown. For ease of reference, the table is reproduced here.

Key to Appraising Significance of Predicted Effects

Likely Significant Effects:		
Major Positive	++	Policy would resolve an existing sustainability problem; effect considered to be of national/international significance
Minor Positive	+	No sustainability constraints; effect considered to be of regional/ national/international significance
Neutral	0	Neutral effect i.e. no overall effects or not-applicable
Minor Negative	-	Potential sustainability issues, mitigation possible; effect considered to be of regional/national/international significance
Major Negative	--	Problematical because of known sustainability issues; mitigation difficult and/or expensive; effect considered to be of national/international significance
Uncertainty	**?**	Where the significance of an effect is particularly uncertain, e.g. insufficient information is available at the plan stage to fully appraise the effects of the policy or the potential for successful mitigation, the significance category is qualified by the addition of the symbol "?"

1.2. The NPS for Gas Supply Infrastructure and Gas and Oil Pipelines

The NPS for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) in conjunction with the Overarching NPS for Energy (EN-1) sets out the relevant planning factors that should be considered by the IPC when determining whether development consent should be granted for a proposed scheme.

EN-4 has been developed via an iterative process, taking account of the ongoing appraisal of the predicted sustainability effects. As the draft NPS was developed, specific topic sections were reviewed by technical specialists and recommendations were made by the AoS team to DECC for their consideration. A record of some of these recommendations and responses to them, highlighting how the NPS was developed was provided in Section 2 of AoS-4 published for consultation in November 2009. Iterative working continued with the revisions to EN-4 and AoS-4 made as a result of the public consultation.

1.2.1. The Content of the NPS for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4)

The definition of what is a nationally significant energy infrastructure project (and therefore requires consent under the Planning Act 2008), varies between technologies. In the case of gas and oil supply infrastructure, including pipelines, the definition is described as follows:

(i) Underground gas storage and Liquefied Natural Gas (LNG) facilities which meet one of the following two tests:

- the storage or working capacity test: a project would pass this test if the storage design capacity on completion of the proposal is equivalent to 43 million standard cubic metres (Mcm) of gas or higher; or
- the maximum flow rate test: a project would pass this test if it has a projected delivery flow rate capacity equivalent to 4.5 million standard cubic metres of gas per day (Mcm/d) or higher.

An alteration to underground gas storage or an LNG facility will be for the IPC to consider if it increases the working capacity or the maximum flow rate of the facility by the above volumes. Applications under this category will cover: underground gas storage in natural porous strata (depleted hydrocarbon fields, aquifers); underground gas storage in salt caverns; and new LNG facilities capable of receiving, storing and re-gasifying LNG.

(ii) Gas Reception facilities with a projected maximum flow rate capacity equivalent to 4.5 million standard cubic metres of gas per day (Mcm/d) or higher (there is no capacity test).

An alteration to a Gas Reception facility will be for the IPC to consider if it increases the maximum flow rate by the above volume. Applications under this category will include Gas Reception facilities where gas is received in gaseous form from outside England, Scotland and Wales.

(iii) Two categories of pipeline:

- Gas Transporter Pipelines requiring an Environmental Impact Assessment (EIA) consent either because they meet the EIA threshold or because they have a significant effect on the environment and where the design operating pressure is more than 7 bar gauge. The pipeline must convey gas for supply to at least 50,000 customers or potential customers of one or more gas supplier. Gas Transporter has the same meaning as in Part I of the Gas Act 1986; and

- pipelines over 16.093 km [10 miles] long which would otherwise require consent under Section 1 of the Pipe-lines Act 1962 together with diversions to nationally significant pipelines regardless of length. These pipelines are referred to in this NPS as cross-country pipelines. They could be carrying gas or oil or a chemical.

The Overarching NPS for Energy (EN-1) identifies the need for new energy generation capacity and a diverse mix of fuels and technologies, including gas supply infrastructure and gas and oil pipelines in order to meet energy policy objectives. EN-4 covers impacts that are specific to gas and oil supply networks and should be read in conjunction with EN-1 which covers the general impacts of energy infrastructure.

The way in which the need for new energy infrastructure is established in EN-1 means that there is no need to consider at the level of individual projects whether there is a need for new energy infrastructure development of a particular type (see Part 3 of EN-1). However, when an application is made for development consent, the decision-maker will need to consider whether the benefits arising from the proposed development (including the contribution which it would make towards satisfying the need for new energy infrastructure) outweigh any adverse impacts which it would have (see Section 4.1 of EN-1).

Certain impacts may result from the development of new energy infrastructure regardless of the specific technologies involved. EN-1 identifies (in Part 5) the potential generic impacts of new energy infrastructure and provides the basis for decision making with respect to each impact topic (i.e. landscape and visual or socio-economic impacts) but does not cover impacts that would be specific to a particular energy technology.

Generic Impacts detailed within EN-1		
N-1 also contain	• Air emissions; • Biodiversity and geological conservation; • Civil and military aviation and defence interests; • Coastal change; • Dust, odour, artificial light, smoke and insect infestation; • Flood Risk; • Historic Environment;	• Landscape and visual impacts; • Land-use including open space, green infrastructure and greenbelt; • Noise; • Socio-economic; • Traffic and Transport Impacts; • Waste management; and • Water quality and resources.

EN-1 also contains (in Part 4) information about other matters which may be of relevance to the handling of any application for development consent for new large-scale energy infrastructure, such as adaptation to the effects of climate change, and the relationship between the planning regime and other statutory controls such as those on pollution and hazardous substances. The main topics where gas supply infrastructure and gas and oil pipelines detailed in EN-4 may result in technology-specific impacts in addition to those set out in EN-1, are as follows.

Technology-Specific Impacts detailed within EN-4	
Underground Natural Gas Storage	**LNG Import Facilities**
• Disposal of brine • Noise and Vibration • Water Quality and Resources	• Dredging • Landscape and Visual • Noise and Vibration
Gas Reception Facilities	**Gas and Oil Pipeline**
• Noise and Vibration	• Landscape and Visual • Noise and Vibration • Soil Geology • Water Quality and Resources

1.3. Alternatives Considered

As explained in Section 1.3 of the AoS for EN-1, the AoS exercise for the energy NPSs also fulfils the requirements of the Strategic Environmental Assessment (SEA) Directive (2001/42/EC) to produce an environmental report on certain types of “plan or programme”. The energy NPSs are such a plan or programme because they set the framework for the granting of development consent to large-scale energy infrastructure.

The SEA Directive requires 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”.

Certain strategic alternatives to the draft NPSs as a plan were appraised and reported in the draft AoSs published as part of the November 2009 consultation. As a result of this consultation, the Government decided to look again at the AoSs and the draft NPSs, including the analysis of alternatives. The work presented in this section cannot

be compared directly with that reported in the November 2009 draft AoSs and is intended to take the place of the earlier assessment.

The analysis of reasonable alternatives provides a strategic context for the detailed assessment of the likely significant effects of NPS policies, as well as a means of evaluating them by comparing them with other ways of achieving the same wider energy policy objectives through the planning regime – both in terms of their comparative merits as ways of achieving those objectives and in terms of their environmental, social and economic impacts.

Part 3 of AoS-1 contains a strategic-level analysis of alternatives to the policies in EN-1 and describes the process of identifying and evaluating alternatives in more detail. This AoS for EN-4 is concerned with the analysis of alternatives to those policies in the NPS suite which are of most direct relevance to gas supply infrastructure and gas and oil pipelines. Although, as noted above, EN-4 contains information on the aspects of issues and impacts which are considered in EN-1, such as land use and biodiversity, which are specific to the infrastructure covered in EN-4, the key points of policy on these are laid down at a generic level in EN-1 and alternatives to them are considered in AoS-1. The AoSs for EN-2, EN-3 and EN-5 concentrate on different approaches to reducing or eliminating the impacts of the technology concerned which experience shows are most objectionable, such as (in the case of EN-3) the noise and shadow flicker effects of onshore wind farms. In the case of the infrastructure covered by EN-4, consultation has not revealed similar levels of concern about any of the impacts associated with its development, and the technology-specific NPS does not set out any policies which are distinct from those set out at a generic level in EN-1. Alternatives such as setting development policies on the assumption that new gas supply infrastructure or gas and oil pipelines are not needed, or setting development policies on a generally more restrictive basis for environmental protection reasons, are therefore sufficiently covered in the generic treatment of alternatives in the AoS for EN-1 (see also Annex G to that AoS). However, one specific alternative to EN-4 is worth considering here, as follows:

- the Government would take a strategic view on locations where it is best to develop new oil and gas infrastructure (based on geology, cost, etc) and limit consenting to those areas.

1.3.1. The NPS policies

In keeping with the approach adopted for all technologies except nuclear in the energy NPSs, EN-4 does not designate particular locations as the focus for development for the types of infrastructure which it covers. The choice of locations is left to the market, with the development consent regime operating to filter out any proposals which would have unacceptable adverse impacts, and ensuring that appropriate mitigation is in place for the infrastructure consented.

1.3.2. Discussion of alternatives

A similar policy of not limiting consent to particular areas has been adopted in EN-1, EN-2, EN-3 and EN-5. No detailed alternative has been considered to this approach in relation to the kinds of infrastructure covered by EN-2 and EN-3 because it is considered that there are too many variables in relation to its location and the likely scale of development, so that any policy of designating only certain areas as suitable for such infrastructure is likely to result either in unacceptable cumulative effects as infrastructure is concentrated in too small an area, or in planning blight if too large an area is designated. With the infrastructure covered by EN-4, however, the major sources of demand, existing infrastructure, and, in the case of gas, the location of geologically suitable areas for underground storage, may provide sufficient fixed points to justify considering in more detail an alternative which would represent a departure from the general case by case, market-led approach taken in the NPSs, rather than leaving it to be dealt with only as part of generic Alternative A4 in AoS-1 (as has been done with the infrastructure covered by EN-2 and EN-3).

The implementation of such an alternative would involve:

- the designation of locations led by an estimate of the type and amount of infrastructure required; and

- the designation of locations based on the suitability of the receiving environment.

The alternative focuses on the approach to avoiding or reducing the likely significant adverse impacts of gas and oil infrastructure development. It was considered as an alternative to dealing with each application on a case by case basis.

2. Appraisal Findings

2.1. Introduction

The scope and methods of appraisal are detailed in the Overarching AoS-1. The strategic alternative identified for Gas Supply Infrastructure and Gas and Oil Pipelines in EN-4 was assessed using Sustainable Development themes that keep the appraisal at a higher and strategic level. The preferred policy approach was to promote the implementation of the aims of EN-4 was appraised further using the AoS framework of objectives.

2.2. Alternatives

The findings of the appraisal of the strategic alternative for EN-4 are set out below, arranged by Sustainable Development theme.

2.2.1. Climate Change

The designation of strategic areas within which consent would be given is likely to have similar effects to EN-4 in terms of climate change as all locations are likely to encounter similar problems, requiring the equal consideration of climate change adaptation mitigation measures and the impacts of the development on climate. This is particularly pertinent to coastal locations, which have been identified as the areas most likely to be affected by climate change, and where the focus for LNG facilities and gas reception facilities would be due to the requirements of the developments.

The clustering of developments within strategic areas could result in benefits and disadvantages in terms of climate change adaptation measures, with developments within the strategic areas collectively benefitting from the measures implemented. However, the concentration of development within specified areas may require additional controls to ensure that developers implement a higher standard of mitigation measures within their designs to facilitate the specified level of development within those areas. Without these additional controls, it may become increasingly difficult and expensive for developers to develop gas supply infrastructure and gas and oil pipelines with built-in climate change resilience. A likely side-effect of these additional controls is to increase the costs of development. In terms of climate change resilience, it is likely that less clustering of development would be preferential. It is likely that the designation of strategic areas would be undertaken based on the specific requirements of existing or known technologies. Future advancements in technologies may result in different locational requirements outside the specified areas. Therefore, the designation of strategic areas could result in the inability for future developments, which may be more sustainable, to optimise efficiency and, potentially, prevent development altogether. This may have implications for climate change.

With regard to LNG facilities, it may be possible to specify locations for development that are less susceptible to climate change, e.g. more sheltered locations along the west coast of England and Wales. This may not be possible for gas reception facilities receiving gas supplies from Scandinavia and the Continent along the east and south coasts of England, coastlines which are more vulnerable to climate change effects.

The designation of strategic corridors for gas and oil pipelines may result in an increased susceptibility to climate change due to the inflexibility, in terms of size and location, of the corridors and the inability of the pipeline to be designed to avoid certain features. However, it is likely that such corridors would be wide enough that avoidance of certain features would not be an issue.

Headline SD themes	EN-4	Alternative
Climate Change		+/-

2.2.2. Security of Energy Supply

The designation of strategic areas within which consent would be given is likely to have similar effects to EN-4, with no specific effects in terms of the sustainable use of resources, raw materials and material assets with regard to underground gas storage or gas receptor facilities. Similarly, effects for LNG facilities are likely to be the same as dredging is likely to remain a requirement regardless of location. The designation of strategic corridors for pipelines may result in the sterilisation from other development of wide tracts of land, particularly where there are underlying mineral reserves. However, it is likely that such corridors would be wide enough that avoidance of features such as mineral reserves would not be an issue.

The designation of specific areas and corridors for the development of gas supply infrastructure and gas and oil pipelines would result in the restriction of development into specific areas or corridors, potentially resulting in an increasing difficulty for the development of future gas and oil supply infrastructure particularly, if insufficient area was allocated. This inability to develop could result in a reduction in security of supply to industry and for domestic use. In addition, the concentration of assets may also result in an increase to the security threat to those assets which, if successfully targeted, could directly affect the security of supply.

Headline SD themes	EN-4	Alternative
Security of Energy Supply		-

2.2.3. Health and Well-Being

The designation of specific areas and corridors for the development of gas supply infrastructure and gas and oil pipelines may result in a further concentration of development in addition to that which would occur under EN-4 due to the specific requirements of the developments (i.e. geological, coastal, etc). This concentration of development may result in an increase in local effects, in terms of noise, air quality and health and well-being, potentially escalating the effects to a regional scale. These cumulative effects would be both spatial and temporal in nature, occurring over the same area and timeframe. However, it is considered that designated areas and corridors would cover large and widely spread areas and any effects of concentration would remain at a local level.

The designation of specific areas and corridors may have effects on equality as certain areas of England and Wales would be excluded from the opportunities presented by the developments, such as access to employment and associated economic benefits. They would also be excluded from the health and safety risks and other health and well-being effects presented by such developments. However, the potential effects are likely to be similar to EN-4.

Headline SD themes	EN-4	Alternative
Health & Well-Being		+/-

2.2.4. The Economy

The designation of strategic areas and corridors within which consent would be given may lead to effects on the economy, both pre-development and post-construction. The allocation of land for development may lead to blight as land is ‘reserved’, preventing other forms of development from taking place. With cross-country pipelines, their installation may result in the sterilisation of wide tracts of land, owing to the need to impose restrictions on development over the route of pipelines. This is particularly the case where it is necessary to lay multiple pipelines, which have to be a minimum distance apart. This may impact on the local, and potentially the regional, economy. However, it is likely that strategic areas and corridors would be large or wide enough that this could be avoided.

Similarly, the designation of strategic areas and corridors, including the post-construction sterilisation of wide tracts of land, could also result in future development of gas and oil supply infrastructure becoming increasingly difficult as land availability becomes limited or non-existent. The inability to build the necessary infrastructure may lead to issues of security of supply affecting the national economy.

As mentioned above, it is likely that the designation of strategic areas would be undertaken based on the specific requirements of existing or known technologies, whereas potential advances in technologies could result in different locational requirements outside the specified areas. The designation of strategic areas could, therefore, result in the inability for future developments to optimise efficiency and, potentially, prevent development altogether. This may have implications for security of supply and the national economy.

The designation of strategic areas within which consent would be given is likely to have other effects on the economy that are similar to EN-4. The further concentration of development in addition to that which would occur under EN-4 due to the specific requirements of the developments may provide some additional advantage in terms of local employment, particularly with LNG facilities. However, the operational employment opportunities offered by gas supply infrastructure are small and concentrating development within certain areas is unlikely to present additional benefits over EN-4.

Headline SD themes	EN-4	Alternative
The Economy		+/-

2.2.5. The Built Environment

The designation of strategic areas and corridors within which consent would be given is likely to result in similar effects to EN-4. However, the potential further concentration of development in addition to that which would occur under EN-4 as a result of the geological or coastal requirements of the gas supply infrastructure may result in a concentration of effects in terms of flood risk and coastal change, traffic and transportation, and archaeology and cultural heritage. These cumulative effects would generally occur at local level, possibly escalating to a regional scale.

The installation of cross-country pipelines within strategic corridors may have particular effects during construction, with cumulative effects on the built environment occurring within the same areas and within concurrent (or subsequent) timeframes. Pinch points to development may also arise, increasing the difficulty in the avoidance of certain built environment features. However, it is likely that strategic corridors would be wide enough that this could be avoided and the effects would remain in a local scale within the strategic corridors.

Headline SD themes	EN-4	Alternative
The Built Environment		0

2.2.6. The Natural Environment

As with the Built Environment the designation of strategic areas and corridors for consent is likely to result in similar effects to EN-4. The potential further concentration of development in addition to that which would occur under EN-4 as a result of the geological or coastal requirements of the gas supply infrastructure may also result in a concentration of effects in terms of ecology; water quality; landscape and visual; and soils and geology, with pinch points increasing the difficulty of avoidance of certain natural environment features within strategic corridors. However, it is likely that strategic areas and corridors would be of sufficient size and sufficiently widespread to avoid significant adverse effects. The cumulative effects of concentration would also generally occur at a local level.

Headline SD themes	EN-4	Alternative
The Natural Environment		-

2.2.7. Summary of Alternatives Findings and Preferred Approach for the NPS

Headline SD themes	EN-4	Alternative
Climate Change		+/-
Security of Energy Supply		-
Health & Well-Being		+/-
The Economy		+/-
The Built Environment		0
The Natural Environment		-

The alternative policy to EN-4 of the designation of strategic areas and corridors within which consent would be given is likely to result in similar effects to EN-4 as the energy technologies which may result from EN-4 will be clustered in certain locations as a result of their specific development requirements. For example, the development of underground storage of gas within salt caverns will be focused within Wessex, West Lancashire, Cheshire and the Yorkshire North Sea Coast[1] as these areas are where the suitable rock strata are located. Similarly, gas storage within oil and gas fields will be located within the north east of England, the East Midlands, the Wessex-Channel Basin and West Lancashire. LNG facilities require coastal locations with deepwater channels capable of taking large LNG tankers. Gas receptor facilities also require coastal locations, restricted to the east and south coasts of England due to the importation of gas via pipelines from Scandinavia and the Continent.

The establishment of strategic corridors for gas and oil pipelines may prove difficult as the pipelines may be required to connect to a variety of energy technology installations both within EN-4 and also EN-2 (gas or oil fired power stations). These energy technology installations often have their own requirements for development locations and may result in very wide, or a complex web of, strategic corridors to ensure connection.

One potential effect may arise from the restriction of development into smaller areas than would otherwise occur with EN-4. This could result in the concentration of effects within these areas, with these spatial cumulative effects arising during all phases of the developments, from construction through to decommissioning, and potentially elevating the effects from local significance to regional significance.

In conclusion, it is not clear that the alternative would bring significant benefits as compared with the approach set out in the NPSs, and its potential dampening effect on innovation and more sustainable technologies could be harmful. The geographical constraints on underground storage and LNG facilities are likely in practice to dictate their location whether or not the alternative is adopted, and it is not clear that a more centrally planned approach to gas and oil pipeline development would be advantageous. Accordingly, the approach set out in the NPSs is preferred.

[1] *Storage of Gas In Your Area – Your Questions Answered (BERR)*

3. Appraisal of draft NPS EN-4

Gas Supply Infrastructure and Gas and Oil Pipelines may have various impacts on communities and the environment depending upon the nature of the development and its location. Certain of these impacts are common to other energy infrastructure development and the findings of the appraisal for these generic effects are detailed in the Overarching AoS-1. The likely significant effects of the technology specific policies, requirements and guidance in EN-4 were appraised against the baseline conditions using the AoS framework of 14 topics with objectives for sustainability. The appraisal focused on the technology specific impacts with consideration of mitigation measures, such as the development control policies included in the Overarching AoS-1 in order to avoid duplication of assessment. It then considered the strategic effect of the implementation of EN-4 on the AoS objectives, giving consideration to the role of EN-4 in providing greater certainty to energy developers and facilitating energy networks infrastructure more rapidly than would otherwise occur. A summary of the generic effects from AoS-1 is included for context at the beginning of each topic appraisal. The likely significant effects arising specifically from gas and oil networks infrastructure are then discussed, including suggestions for mitigating significant negative effects, and a summary of the appraisal of EN-1 is provided for each topic as follows:

3.1. Climate Change

AoS Objective	Assessment (by timescale)		
	S	M	L
1. Climate Change: To minimise detrimental effects on the climate from greenhouse gases and ozone depleting substances and maximise resilience to climate change.	0	-?	-?

AoS 1 describes the effects of energy infrastructure on climate change as including:

- minor positive effects for climate change through the accelerated consenting/construction of low carbon electricity projects with the potential for cumulative positive effects in the medium to long term; and
- minor positive effects in the medium and long term for climate change adaptation objectives through the requirements in EN-1 (EN-2 to EN-6) for adaptation and resilience measure in all new energy sector developments.

In general, new energy infrastructure will replace older, less efficient infrastructure leading to a positive impact against the climate change objective.

EN-1 does not identify any generic effects in relation to climate change for the Energy NPSs, but does set out generic considerations to take into account with regard to the potential impact of climate change on oil and gas network infrastructure. This includes a description of how projects should be designed to be resilient to such effects.

It is anticipated that EN-1, in-combination with the technology-specific NPSs, will improve the speed of the application process and could result in low carbon energy infrastructure being implemented within a faster timescale. This is likely to make a positive contribution towards the realisation of the Government's low carbon energy targets and progress towards a low carbon economy. However, the oil and gas network infrastructure will not directly contribute to the distribution of this low carbon energy nor to the achievement of the objective, but will continue the distribution of energy from non-renewable sources.

EN-1 identifies coastal change as a generic impact of climate change applicable to all energy infrastructure. LNG facilities and gas reception facilities which, out of necessity, are likely to be coastally located, are particularly at risk from rising sea levels, including flooding and coastal erosion.

A consequence of climate change is changing weather patterns, which can lead to an intensification of storms. Above ground structures associated with all oil and gas network infrastructure, including well-heads associated with underground gas storage and pumping stations and compressor stations associated with oil and gas pipelines, are at an increased risk from flooding, high winds and lighting strikes. Flooding also has the potential to lead to earth movements and subsidence. Pipelines are also sometimes required to traverse steeply angled slopes, resulting in an increased risk of earth movements and subsidence particularly during periods of heavy rain. Conversely, drought conditions may also cause earth movements and subsidence due to shrinkage of the soils structure. Flood risk and coastal change is discussed in more detail within Section 3.

Linked to climate change are higher average temperatures. This may affect the storage, processing and re-gasification at LNG facilities.

EN-4 directs applicants of gas and oil supply infrastructure to include climate change resilience measures as part of an application, setting out how the proposal would be resilient to increased risk of flooding, increased wind strengths and storms, higher temperatures and increased risk of earth movements or subsidence from increased flooding and drought: however, no specific measures are identified. EN-1 notes that the applicants will be expected to take appropriate mitigation measures to address negative effects on coastal geomorphology, in consultation with the Marine Management

Organisation, the Environment Agency, Local Planning Authorities, other statutory consultees, Coastal Partnerships and other coastal groups as appropriate.

3.1.1. Summary

Climate change resilience is an important consideration for LNG facilities and gas reception facilities. EN-4 provides guidance for applicants on the consideration of the effects of climate change such as an increase in the risk of flooding, damage from the effects of wind, higher temperatures and earth movement or subsidence.

It is assessed that the expansion of oil and gas network infrastructure, as promoted through EN-4, will have neutral effects on climate change in the short-term, as it will continue to support a reliance on fossil fuel based energy production, although the replacement of old, less efficient infrastructure with new, more efficient infrastructure will contribute positively to the climate change objective. This continued support is required to provide security of supply and allow for the development of low carbon energy technology. As such, in the medium to longer term EN-4 could contribute beneficially to the climate change objective as long as the reduction on the reliance of fossil fuels remains a key focus. However, as it is recognised that oil and gas will continue to play an important part in the UK's fuel mix for years to come, it is assessed that the expansion of oil and gas network infrastructure will have negative effects on climate change, although the significance of the effect is uncertain.

3.2. Ecology (Flora and Fauna)

AoS Objective	Assessment (by timescale)		
	S	M	L
2. Ecology (Flora and Fauna): To protect and enhance protected habitats, species, valuable ecological networks and ecosystem functionality.	**?**	**?**	**?**

AoS 1 describes the generic impacts of energy infrastructure and their potential effects on ecology as including:

- loss of habitat (and species) - direct loss from land take or the abstraction of water resources, and indirect or temporary, for example during construction phases;
- disturbance of habitats and species - through noise, light and visual and dust pollution arising from construction, operation and decommissioning activities;

- pollution impacts - from emissions to water, ground and air with impacts on water, soil and air quality;
- habitat fragmentation/ severance/ isolation - through development (in particular linear features);
- obstructions - from tall structures presenting obstacles to migration and flight paths;
- changes to microclimates - alterations to wind patterns/ speeds, shading/ shadow effects; and
- habitat integrity and connectivity improvements from management, restoration and enhancements activities.

EN-4 identifies that dredging may have specific effects on the biodiversity of local marine, coastal and estuarine environments, particularly fish and bird life. LNG facilities require coastal or estuarine locations with the deepwater channel requirements of the large LNG tankers maintained through dredging. EN-4 also recognises that the deposition of the dredging spoil must be undertaken responsibly.

The specific effects of dredging identified within EN-4 include the smothering of nearby habitats and benthic communities, increased suspended solids and contaminant release. Aquatic vegetation and invertebrates provide valuable food sources for fish and birds. If these sources are affected, impacts to the populations of the species that feed on them are also likely. Increases in suspended solids within the water have the potential to impact on fisheries. Disturbed sediments may also release contaminants into the water, which can also impact on biodiversity.

The cessation of dredging operation in the long-term may also affect the local coastal environment, and the ecology it supports, with either positive or negative effects on ecosystems which have become accustomed to the influences of dredging operations.

Underground storage of gas within salt strata is identified as having the potential for aquatic ecological impacts from the disposal of large quantities of brine (water with a high saturation level of salt) to the sea/estuary. Gas is stored within specially created caverns, created through the solution mining of the salt using water. The resulting saltwater must be disposed of to a suitable location with enough energy to ensure effective mixing and dilution. Brine is denser than seawater and freshwater, and will sink to the bottom, impacting on benthic communities and bottom feeding fish and other species. Whilst fish can avoid these areas, benthic communities may not be able to due to limited mobility, and exposure to plumes of highly saline water could lead to death or

injury[2]. The saltwater plume may also act as a physical barrier to fish migration. These effects will be temporary (short-term), occurring throughout the duration of the solution mining activity although recovery of the benthic communities is likely to take longer.

No specific effects associated with oil and gas pipelines are set out in the NPS, and the IPC is directed to the generic issues set out in EN-1. However, fragmentation of habitat by linear developments, even temporarily, could result in significant effects on ecological resources. For example, the removal of hedgerow sections for several miles is thought to fragment the habitat of some species (e.g. dormice and some bat species)[3,4].

EN-1 suggests that appropriate mitigation measures should be included as an integral part of the proposed development. During construction, activities should be confined to the minimum area possible, risk of disturbance and damage should be minimised and, where practical, habitats should be restored on completion of the works. Mitigation of the effects of transport access arrangements is also highlighted for consideration. During operation, risk of disturbance and damage to species or habitats should be minimised. EN-1 also highlights the need for opportunities to be taken, wherever practicable, to enhance existing habitats or create new ones within the site landscaping proposals.

EN-4 identifies that appropriate mitigation measures are required to address the negative effects of dredging, including the demonstration that best practices will be followed during construction and operation to avoid or minimise risk of disturbance or damage to species and habitats. Appropriate mitigation measures include the avoidance of certain times of the year.

With regard to the disposal of brine, mitigation measures highlight the need for careful siting of offshore outflows to ensure that effective mixing and dilution takes place to avoid or minimise the impact on sensitive flora and fauna.

Fragmentation caused by long distance pipelines can be mitigated through the inclusion of appropriate mitigation techniques, such as the placing of temporary ‘habitats’ during construction activities and the immediate re-planting / reinstatement of vegetation on completion.

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[2] *Appendix N of the King Street Gas Storage Project (Pipelines) - Addendum to the Statement to Inform an Appropriate Assessment (Appendix N), July 2008.*

[3] *Natural England (1996) Dormouse conservation handbook.*

[4] *National Grid (2007) Barton Stacey to Lockerly ES.*

3.2.1. Summary

There are a number of generic effects on ecology that are applicable to all energy infrastructure development, including gas supply infrastructure and gas and oil pipelines. There are also several effects on ecology specific to gas and oil supply infrastructure. The dredging requirements of LNG facilities, to facilitate navigation by large LNG tankers, may have specific effects on the biodiversity of local marine, coastal and estuarine environments, including the smothering of nearby habitats and benthic communities, increased suspended solids and contaminant release. The creation of underground gas storage caverns within salt strata has the potential for aquatic ecological impacts from the disposal of large quantities of brine. This saltwater is denser than seawater and freshwater and will sink to the bottom impacting on benthic communities and bottom feeding fish and other species.

Through promoting the expansion of the oil and gas infrastructure network, EN-1 and EN-4 have the potential for increased strategic negative effects on ecology across England and Wales, particularly in coastal and estuarine locations which are often heavily protected and in the short-term. Both EN-1 and EN-4 include robust and effective mitigations which will help to avoid or minimise negative effects (positive effects may even be possible through the implementation of enhancement opportunities). However, it is considered that the overall effects are uncertain as their significance is dependent on the location of the development and the sensitivity of the receiving environment.

3.3. Resources and Raw Materials

AoS Objective	Assessment (by timescale)		
	S	M	L
3. Resources and Raw Materials: To promote the sustainable use of resources and natural assets and to deliver secure, clean and affordable energy.	0	-?	-?

AoS1 describes the effects of the NPSs for energy infrastructure on resources and raw materials as including:

- positive effects on resources in the long term through the delivery of secure, clean and affordable energy;

- short-term minor negative effects on resources and raw materials through the use of resources for construction materials and production of construction waste from infrastructure projects;

- medium-long-term negative effects through production of nuclear waste and decommissioning redundant infrastructure; and

- negative effects on resources and raw materials in the short-medium term through continued reliance on fossil-fuels (coal, biomass).

EN-4 does not set out any specific requirements for the IPC to consider beyond those identified in EN-1 since the infrastructure outlined in EN-4 is not anticipated to generate notable volumes of waste. Exceptions to this include the disposal of dredging spoil and the disposal of brine.

EN-4 identifies that dredging and spoil deposition have particular implications in terms of waste management with regard to LNG facilities. LNG facilities require coastal or estuarine locations with deepwater channels and jetties. Dredging is required to maintain the required depths, and the deposition of the spoil must be undertaken responsibly. Ecological effects may result through the smothering of nearby habitats and benthic communities, increases in suspended sediments and the release of contaminants (see Section 3.2).

A further effect specific to EN-4 is the disposal of brine associated with the solution mining of salt cavities for the underground storage of gas. Whilst EN-4 promotes the disposal of the brine for commercial use by industry so that the mineral resource can be used sustainably, it also recognises that this may not be possible stating that disposal to underground reservoir or to sea should only be undertaken as a last resort. Ecological effects may also result (See Section 3.2). Where discharges are to water bodies, including groundwater or the sea, EN-4 advises that the Environment Agency is consulted early in the process (at or before pre-application stage) to ensure that appropriate measures and environmental permits/consents are in place. For disposal at sea, effective mitigation may involve the careful offshore siting of outflow pipes and adjustments to the rates of discharge. Alterations can also be made to the level of salt saturation within the water to be discharged.

EN-4 identifies that appropriate mitigation measures are required to address negative effects of dredging. These mitigation measures should demonstrate that best practice will be followed during construction and operation to avoid or minimise risks associated with disturbance and disposal.

As stated in Section 3.1 it is anticipated that EN-1, in combination with the technology-specific NPSs, will improve the speed of the application process and could result in low carbon energy infrastructure being implemented within a faster timescale, contributing positively towards the realisation of the Government's low carbon energy targets and

progress towards a low carbon economy. However, the oil and gas network infrastructure facilitated under EN-4 will continue to provide the mechanism for distribution and delivery of oil and gas resources required for the production of energy at facilities covered within EN-1 and EN-2, or for domestic use, and continuing a reliance on fossil-fuels, particularly as it is recognised that oil and gas will continue to play an important role within the UK's energy mix for some time.

3.3.1. Summary

EN-4 is not anticipated to generate notable volumes of waste or impact on the sustainable use of raw materials and resources. Exceptions to this include the disposal of dredging spoil associated with LNG facilities and the disposal of brine associated with the solution mining of underground gas storage caverns.

Through promoting the expansion of the oil and gas infrastructure network, EN-4 with EN-1 has the potential for increased strategic negative effects on resources and raw materials across England and Wales, particularly associated with disposal of dredging spoil and the disposal of large volumes of brine. Whilst both EN-1 and EN-4 contain mitigation measures which will help to avoid or minimise negative effects, it is considered that effects of minor negative significance may arise particularly in the short-term, however, these effects will be experienced at a local level and are, therefore, assessed as of neutral significance. In general, no effects are considered likely in the medium and longer-term. However, when the oil and gas resources/raw materials are also factored in, the infrastructure of EN-4 will continue some reliance on them in the medium to long term, leading to uncertain negative effects.

3.4. Economy and Skills

AoS Objective	Assessment (by timescale)		
	S	M	L
4. Economy and Skills: To promote a strong and stable economy with opportunities for all.	0	+	+

The significant positive strategic effects identified in AoS 1 for the energy NPSs include:

- improved vitality and competitiveness of the UK energy industry through providing greater clarity, with benefits for investment certainty and inward investment;
- enhanced economy, employment and jobs across England and Wales through provision of a secure and affordable supply of energy; and

- benefits for employment in the short, medium and long-term through the planning, construction, operation and decommissioning of energy infrastructure; including for skilled workers and particularly in the low carbon energy industries (including in research and development).

Negative effects at the project level identified include:

- Potential negative economic effects on existing and future land uses, especially during construction; including disruption, land sterilisation, decreases in property values, and cumulative effects on tourism objectives due to visual effects from clusters of infrastructure development.

The additional significant positive strategic effects identified above mean that EN-4 will contribute significantly to the security of gas supply, particularly with regard to underground storage and LNG facilities. This is likely to have direct positive effects on industry and the overall economy as shortages of gas can lead to interruptions of supply for major energy users in industry and the major energy providers to the population of the UK. Increased certainty of supply will also allow for more accurate, longer term planning.

Temporary economic effects may result during the construction of long distance pipelines which largely cross agricultural land. Agricultural land within the working width, including access points, is lost to production, whether it is arable or grazing land, for the duration of the works and for a short period after reinstatement as the land recovers and re-establishes. In order to avoid effects to the local rural economy, compensation must be given as mitigation to the farmers for the loss of production. It addition, compensation may also be required for the loss of any payments to farmers who manage their land under Environmental Stewardship Schemes as the construction of cross-country pipelines may affect their ability to achieve their points targets in any yearly period. The payment of compensation to farmers for the loss of agricultural production will maintain and support a stable rural economy.

3.4.1. Summary

Through promoting the expansion of the oil and gas infrastructure network, EN-4 with EN-1, has the potential to promote an increased certainty to developers; facilitate the planning process; and provide for strategic positive effects on the economy of England and Wales from local to national levels through the provision of a secure supply of energy which is recognised as vital to economic prosperity and social well-being. EN-4 has the potential to have minor negative effects on the local rural economy through the temporary loss of agricultural production associated with long distance pipelines, although compensation removes these effects. As such, it is assessed that EN-4 will have no effects to economy and skills in the short-term, and minor positive effects in the medium and long-term as the effects are considered to be of national significance.

3.5. Flood Risk and Coastal Change

AoS Objective	Assessment (by timescale)		
	S	M	L
5. Flood Risk and Coastal Change: To avoid, reduce and manage flood risk (including coastal flood risk) from all sources and coastal erosion risks by locating infrastructure in lower risk areas and ensuring it is resilient over its lifetime without increasing risks elsewhere.	**0**	**0**	**0**

AoS 1 describes the effects of energy infrastructure on flood risk as including:

- changes to hydrological flows (surface and ground water) from alterations to land use, including increases in impermeable surfaces (built structures, hard standing etc) may result in negative and more uncertain effects in the short, medium and long term;

- construction activities, the introduction of water management measures including sustainable drainage systems (positive effects for water management) and the development coastal/ river defences which may have negative effects in the short term with uncertain effects in the longer term.

Generic guidance on flood risk contained within EN-1 sets out the approach to be taken to assess any application that comes forward, with the principles set out in Planning Policy Statement (PPS) 25: Development and Flood Risk quoted as the principal requirement. PPS 25 will seek to ensure that proposed development does not result in increased flood risk, that it would be safe from flooding given the prevailing flood risk and where possible reduces flood risk overall.

EN-4 does not set out any requirements or identify specific effects relating to flood risk and coastal change associated with gas supply infrastructure and oil and gas pipelines beyond those identified within EN-1, although it is recognised that LNG facilities and gas receptor facilities are likely to be proposed for coastal and estuarine locations and that exceptional circumstances may exist where an increase in flood risk cannot be avoided or mitigated. For example, dredging requirements of LNG facilities, to create deepwater channels and jetties for large tankers, can result in coastal change through changes in coastal dynamics which may increase flood risk elsewhere. See also Section 3.1.

Risk of flooding from surface waters may be particularly relevant to pumping stations which are typically located at low points along pipeline routes. Above ground structures

may also impact on localised flooding, through changes to hydrological flow, exacerbating problems elsewhere of their location, and through increased areas of impermeable surface.

Flooding also has the potential to lead to earth movements and subsidence (see also Section 3.1). This is particularly relevant to oil and gas pipelines where pipeline trenches provide lines of weakness and/or preferential pathways for movement of water and is of particular concern where pipelines cross floodplains.

3.5.1. Summary

Through promoting the expansion of the oil and gas infrastructure network, EN-1 and EN-4 have the potential for limited negative effects on flood risk at local levels, particularly through changes to hydrological flow regimes and increased surface runoff associated with above ground facilities. However, it is likely that these impacts can be effectively mitigated such that no effects arise in the short, medium or long-term.

3.6. Water Quality

AoS Objective	Assessment (by timescale)		
	S	M	L
6. Water Quality: To protect and enhance surface (including coastal) and groundwater quality (including distribution and flow).	0	0	0

AoS 1 describes the effects of energy infrastructure on the water environment as including:

- increased water discharges and atmospheric pollution (eutrophication) can lead to reduced water quality;
- construction, operation and decommissioning activities can increase risk of pollution spills and leaks, which can result in reduced water quality;
- increased abstractions can reduce water levels and therefore modify surface and groundwater flow; and
- construction activities and associated land take can result in modified surface and groundwater flow.

EN-4 identifies that underground storage of gas within salt caverns has specific effects in terms of water quality, recognising that there is a large demand for water during the solution mining phase of construction. This can result in impacts to groundwater resources, the natural environment and public water supply and lead to the loss or reduction of water available to licensed or unlicensed abstractions. Abstractions may also be from rivers, estuaries and the sea.

Following solution mining of underground storage caverns, large volumes of 'brine', or water with a high saturation level of salt, require disposal. EN-4 recognises that a more sustainable and practical use should be found for the brine wherever possible, with disposal to underground reservoir (e.g. disused salt mines) or to the sea only as a last resort (See also Resources and Raw Materials for more details). EN-4 also recognises that discharging brine to sea can have effects on sensitive flora and fauna (see Section 2.5).

EN-4 recognises that dredging and the disposal of dredging spoil in coastal and estuarine locations, as required for the operation of LNG facilities, can result in local increases in suspended sediments and the disturbance of potentially contaminated sediments. Impacts on water quality and resource subsequently lead to effects on to fisheries, fish migration and important biodiversity (see Section 2.5). EN-4 also recognises that the severity of the effects is dependent on magnitude, frequency, methodology and timing.

Further specific effects on water quality and resources are identified for oil and gas pipelines. During construction exposed ground and excavations can potentially affect watercourses, aquifers, water abstractions, discharge points and areas prone to flooding. Effects on watercourses can result through silt runoff during periods of heavy rain, channelled along the exposed working width. Water can also be channelled to low lying areas where localised flooding can result. Similarly, surface clearance and excavations can expose underlying aquifers to further risk of pollution through spillages and leaks. Excavations can also impact on local domestic abstractions and springs used in agricultural production, causing them to dry up or change direction of flow.

One further specific effect associated with pipelines concerns the abstraction and disposal of water used for hydrostatic testing during commissioning. Although this water can be moved along the pipeline to test different sections, it will often require quite considerable volumes.

EN-4 confirms that measures to control abstractions and discharges of water are covered by abstraction licences and environmental permits, including appropriate conditions, issued by the Environment Agency. Similarly, EN-4 confirms that measures to discharge brine are also covered by Environment Agency permits, and suggests specific mitigation measures to reduce the effects of brine discharge to the sea including the siting of the offshore outflow pipe, adjustments to the rate of discharge and reductions in the saline concentration levels.

Mitigation measures for dredging include the undertaking of sediment transfer modelling to predict and understand the impacts and assist with the identification of further mitigation and compensatory measures, and the avoidance of dredging at certain times of the year. Best practice should also be implemented to avoid or minimise disturbance.

Mitigation measures identified for the protection of water quality during the construction of pipelines include: the use of appropriate working methods to prevent spills and to cross rivers, the avoidance of water bodies (where possible), careful storage of materials away from watercourses, careful reinstatement of river banks and reed beds, restoration of vegetation to control runoff, the provision of facilities for the disposal of wastes and sewage, on-going monitoring, and the use of trenchless drilling techniques, where appropriate and suited to environmental conditions.

3.6.1. Summary

There are a number of generic effects on the water environment that are applicable to all energy infrastructure development, including gas supply infrastructure and gas and oil pipelines. The significance of the effects and effectiveness of mitigation depends on the location of development and will need to be evaluated during studies for project level EIAs. The mitigation measures outlined in EN-1 with regard to water quality and resources, including the requirement for an assessment of the impacts of new development on the water environment, should help to minimise negative effects on the water environment.

Through promoting the expansion of the oil and gas infrastructure network, EN-4 has the potential for increased negative effects on local water quality and resources, particularly associated with disposal of large qualities of highly saline water, as a result of operational dredging and during the construction and testing stages of long distance pipelines. Both EN-1 and EN-4 contain mitigation measures which will help to avoid or minimise negative effects, and as effects are largely local, it is considered that the overall effects are of neutral significance in the short, medium and long-term.

3.7. Traffic and Transport

AoS Objective	Assessment (by timescale)		
	S	M	L
7. Traffic and Transport: To minimise the detrimental impacts of travel and transport on communities and the environment, whilst maximising positive effects.	0	0	0

As detailed in AoS 1, through the transport of materials, goods and personnel, energy infrastructure projects can have significant effects on traffic and transport networks, with the effects more pronounced during the construction stage. Identified effects include:

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

EN-4 identifies no specific effects for gas supply infrastructure and oil and gas pipelines although it is recognised that LNG facilities, on coasts and within estuaries, will have associated LNG tanker traffic which may impact on existing shipping movements and other sea users. However, the existing legal framework and its enforcement is expected to ensure that LNG tanker shipments are safely regulated, with LNG tankers obeying all the normal traffic reporting and routeing rules and procedures as well as collision regulations and Port Safety Management Systems.

Effects of construction traffic during the installation of long distance pipelines, whilst generally being of a generic nature, may also have particular characteristics and sensitivities due to the rural nature of the local road network. Temporary disruptions due to closures and diversions may be acutely felt by local communities and road users where smaller/narrower roads are crossed using open-cut techniques rather than the trenchless methods employed for crossing of major roads. HGVs on small, narrow roads can also easily cause congestion and additional road safety issues.

No specific mitigation measures are proposed within EN-4, and effects of construction traffic during the construction of long distance pipelines in rural areas can be effectively managed, with additional care and attention, through generic traffic management measures, such as traffic management plans.

3.7.1. Summary

Other than for some minor negative effects during construction associated with the installation of long distance pipelines, which will be temporary in nature, and impacts associated with the operation of large LNG tankers within existing shipping lanes, EN-4 with EN-1 is considered to have very little to no effects in terms of travel and transport in the short, medium and long-term. In addition, these effects can be effectively managed through generic traffic management measures.

3.8. Noise

AoS Objective	Assessment (by timescale)		
	S	M	L
8. Noise: To protect both human and ecological receptors from disturbing levels of noise.	0	0	0

AoS-1 identifies the potential for the following generic impacts on noise from energy infrastructure projects:

- noise generated as a result of construction activities (for example, from large construction equipment/ machinery);
- operational noise (for example, from the operation of turbines);
- noise generated as a result of decommissioning (for example, from demolition of structures); and
- noise generated as a result of supporting or ancillary services (for example, from increased traffic movements).

EN-4 identifies specific noise effects associated with the drilling of new boreholes required for the construction of underground gas storage facilities, with the brine pumping during the solution mining process, and with the plant (compressors, drivers

etc,) required to reduce or increase the pressure of the gas as it is moved to and from the National Transmission System.

It is also recognised that LNG facilities will generate noise effects from process plant, including compressors, and from the LNG pumps aboard the LNG tankers. There may also be additional noise from the LNG tankers themselves during docking procedures.

Further noise effects are identified associated with gas receptor facilities with regard to ground pipework, compressors (which may be electric motor or gas turbine driven) and process plant, including heaters, inter-stage cooler and control valves.

EN-4 also identifies specific noise effects associated with oil and gas pipelines, particularly during construction when impacts to rural communities and other noise sensitive receptors, such as quiet places and biodiversity, can be felt either side of the pipeline route. Noise effects can arise from site clearance, soil movement, ground excavation, tunnelling, pipe laying and welding and ground reinstatement. These effects are, however, temporary in nature and occur on a rolling basis as construction activities progress in sequence along the working width. Other noise effects can arise through construction traffic on local road networks. Commissioning of the pipelines can also give rise to noise with the use of compressors during post hydrostatic test drying.

EN-4 also recognises that, during the operation of oil and gas pipelines, noise effects may also arise from the associated above ground installations, including gas compressor stations and pumping stations.

Mitigation measures identified within EN-4 to minimise noise effects from underground gas storage facilities include high performance acoustic cladding for buildings, the use of sound attenuators on ventilation systems, acoustic lagging on pipework, multi-stage control valves, high performance gas turbine exhaust silencers, acoustic enclosures on pumps and high efficiency low speed cooler fans and the use of electric rather than gas powered compressors. Many of these mitigation measures are highly effective best practice techniques for noise control, capable of reducing residual noise to acceptable levels, and are applicable other energy technologies and associated structures.

Mitigation measures identified for LNG facilities, gas receptor facilities and above ground installations associated with oil and gas pipelines are included in those identified for underground storage facilities.

3.8.1. Summary

EN-4 has the potential for increased negative noise effects on both human and ecological receptors at a local level, associated with the drilling of new boreholes to create underground gas storage caverns, with brine pumping during the solution mining process, and with operational plant. Noise may also arise at a local level during the operation of the plant associated with LNG facilities and gas reception facilities.

Temporary construction noise may also arise during the installation of oil and gas pipelines, resulting in effects to particularly sensitive rural communities, landscapes and biodiversity. However, both EN-1 and EN-4 include robust mitigations which will help to reduce negative effects to acceptable levels throughout most stages of the development. It is considered that the overall effects are likely to be of neutral significance, with no significant effects beyond the local level in the short, medium to long-term.

3.9. Landscape, Townscape and Visual

AoS Objective	Assessment (by timescale)		
	S	M	L
9. Landscape, Townscape and Visual: To protect and enhance landscape quality, townscape quality and to enhance visual amenity.	-	-	?

AoS 1 and EN-1 note that the landscape and visual effects of energy projects vary in accordance with the type of development, its location and the landscape setting of the proposed development:

- negative effects can occur through construction and operation and can be temporary or permanent. Effects can occur in designated landscape areas (of local or national importance) and in non-designated areas, including towns and can include negative effects on views, visual amenity and on local amenity (e.g. from light pollution).

Further effects that are specific to EN-4 include negative landscape and visual effects from permanent above ground infrastructure associated with each element. This is particularly pertinent to LNG facilities that include large scale structures, such as storage tanks, but is also relevant to the well-heads associated with underground storage and the compressor/pumping stations associated with pipelines. These facilities, which are generally low-lying and therefore more easily screened, are likely to be located in rural areas with accompanying landscape designations and sensitivities.

These effects occur during construction (short-term) and operation (medium-term), but can be reversed in the long-term if decommissioned. The magnitude of these effects is dependent on the sensitivity of the receiving environment, for example, the negative effects caused by development in AONBs or National Parks are likely to be considered more strategically significant than in a local landscape designation (although this will be an important local consideration for the IPC).

EN-4 identifies the temporary (short-term) construction effects to specific elements of the landscape within or adjacent to pipeline routes, such as grasslands, field boundaries (hedgerows, hedgebanks, drystone walls, fences), trees, woodlands and watercourses. Medium-term effects are likely with specific elements of the landscape, such as hedgerows and woodlands, as the landscape recovers and the vegetation re-establishes. EN-4 also identifies limited longer-term effects to landscape from planting restrictions over and immediately adjacent to the pipelines, resulting in a permanent visual 'scar' which depicts the route of the pipeline. Other longer-term effects of pipelines include the small structures and marker posts positioned at regular intervals or at specific locations.

EN-1 suggests that one way to mitigate the landscape and visual effects is to reduce the scale of a development, but recognises that this may result in significant operational constraint and reduction in function, making the development unfeasible. With LNG facilities, mitigation includes the countersinking the larger structures or use of squat tanks without any reduction in function.

EN-4 identifies that reducing the working width required for the installation of a pipeline should be considered, where feasible, to reduce effects to the landscape particularly where it is not possible to fully reinstate the route.

EN-4 also identifies that where protected trees and hedgerows are to be crossed, e.g. ancient woodlands, trees subject to Tree Preservation Orders and hedgerows subject to the Hedgerow Regulations 1997, alternative construction methods, such as horizontal directional drilling or thrust bore should be considered. This should also apply to other important landscape features that cannot be easily replaced or take time to re-establish.

3.9.1. Summary

EN-4 includes negative landscape and visual effects from permanent above ground infrastructure associated with each element. This is particularly pertinent to LNG facilities. Whilst mitigation measures are available to reduce the effects, full mitigation of large scale structures can be difficult. EN-4 also identifies temporary (short-term) construction effects to specific elements of the landscape within or adjacent to pipeline routes. In most instances it is possible to fully mitigate for these effects.

Through promoting the expansion of the oil and gas infrastructure network, EN-4 with EN-1 has the potential for increased strategic negative visual effects on landscape across England and Wales. Although both EN-1 and EN-4 include robust mitigations which will help to minimise negative effects, it is considered that the overall effects are likely to be of minor negative significance for the short and medium-term and unknown for the longer-term, as effects will be dependent on decommissioning and remediation.

3.10. Archaeology and Cultural Heritage

AoS Objective	Assessment (by timescale)		
	S	M	L
10. Archaeology and Cultural Heritage: Protect and where appropriate enhance the historic environment including heritage resources, historic buildings and archaeological features.	0?	0?	0?

AoS1 describes the effects of the NPSs for energy infrastructure on Archaeology and Cultural Heritage as including:

- Disturbance or loss of heritage assets[5] as a result of ground works or excavation; and
- Impacts on the setting of nearby heritage assets.

EN-4 identifies no specific effects with regard to archaeology and cultural heritage. Effects to heritage assets are generally associated with the footprints of development and with the settings of assets within surrounding areas, both of which are generic effects and identified in EN-1.

EN-4 recognises the importance of hedgerows and their protection under the Hedgerow Regulations 1997. The Regulations considers hedgerows to be 'important' based on a number of criteria, one of which is their age. Hedgerows may have been present within the landscape for many centuries, particularly if associated with an boundary, such as a parish or estate boundary, and may be important features of the historic landscape. The effects on hedgerows are discussed further within the Landscape, Townscape and Visual section.

EN-4 identifies no specific mitigation measures with regard to archaeology and cultural heritage. The generic mitigation measures identified in EN-1 are applicable to all elements of gas supply infrastructure, including pipelines, and largely involve avoidance of assets through careful siting. As with all energy technologies, instances will arise where proximity to an asset cannot be avoided altogether, and full mitigation to the setting of the asset may be difficult to achieve, particularly for above ground structures.

[5] Those elements of the historic environment – buildings, monuments, sites or landscapes – that have significance due to their historic, archaeological, architectural or artistic interests are called 'heritage assets'.

3.10.1. Summary

With regard to archaeology and cultural heritage EN-4 is considered to have no effects in addition to the generic potential negative effects, identified within EN-1, of large-scale energy infrastructure on the historic environment, largely associated with the footprints of development and with the settings of assets within surrounding areas. The generic mitigation measures identified in EN-1 are applicable to all elements of gas supply infrastructure, including pipelines, and largely involve avoidance of assets through careful siting. Therefore, it is considered that EN-4 will have no significant effects in the short, medium and long-term, however, as with all energy infrastructure, instances will arise where proximity to a historic asset cannot be avoided altogether, and full mitigation to the setting of the asset may be difficult to achieve. As the significance is dependent on the location of the development and the sensitivity of the receiving environment, some uncertainty exists with regard to the overall significance.

3.11. Air Quality

AoS Objective	Assessment (by timescale)		
	S	M	L
11. Air Quality: To protect and enhance air quality on local, regional, national and international scale.	0	0	0

As detailed in AoS 1, energy infrastructure projects can have significant negative effects on air quality during construction, operation and decommissioning. These include:

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

EN-4 identifies the potential for some specific effects with regard to air quality due to the need to flare gas at some facilities to deal with a continuous stream of low volume waste gas from processing. The venting of gas may also take place on a less frequent basis. These activities are generally subject to environmental controls to ensure they do not exceed acceptable levels. The generic effects identified in EN-1, associated with the

construction, operation and decommissioning of energy infrastructure apply equally to the gas supply infrastructure of EN-4 with sources of air emissions including vehicles, construction machinery and equipment, and operational plant.

EN-1 identifies some specific mitigation measures with regard to air quality. EN-1 suggests limited mitigation measures to reduce negative effects, however, best practice techniques for the control of air emissions are available that are highly effective and capable of reducing residual air emissions to acceptable levels. These measures are applicable to gas supply infrastructure of EN-4, particularly the above ground structures.

3.11.1. Summary

EN-4, with EN-1, has the potential for increased strategic negative air quality effects on both human and ecological receptors, and the wider countryside. However, generic and robust mitigation measures are available which will help to reduce negative effects to acceptable levels, particularly on a local to regional scale, that are applicable to gas supply infrastructure of EN-4. As such, EN-4 is considered to have no additional effects to the generic effects identified within EN-1 in the short, medium and long-term, throughout all stages of the development.

3.12. Soil and Geology

AoS Objective	Assessment (by timescale)		
	S	M	L
12. Soil and Geology: To promote the use of brownfield land and where this is not possible to prioritise the protection of geologically important sites and agriculturally important land.	0?	0?	0?

AoS 1 identifies the potential for a number of generic effects on soil and geology which are applicable across the different types of energy infrastructure development. They include:

- disturbance or loss of soils and geologically important sites; and
- increased risk of pollution and potential contamination of soils.

Effects that are specific to EN-4 with regard to soil and geology relate to long distance pipelines. EN-4 identifies that risk is presented by different soil types, the nature of the underlying strata, underground cavities and unstable ground. Sterilisation of mineral resources and the loss of soil quality are also identified as specific to pipelines.

By their very nature, long distance pipelines cross different soils and geology, all of which can impact on the integrity of the pipeline, and it is important to understand underlying ground conditions. In some instances, pipeline routes may cross areas of geological or geomorphological interest which are difficult to avoid. Other areas may be unstable and susceptible to landslip. EN-4 also recognises that effects to soils may result in some minor residual effects at the surface, such as differential vegetation growth in the short-term.

Mitigation measures identified in EN-4 include the determination of alternative routes to bypass designated areas. This also is applicable to sensitive areas, areas of high risk and areas of mineral resources. A reduction in the length of the pipeline route through the designated site is also suggested in order to reduce effects. Other mitigation measures include the use of alternative techniques to open-cut trenching, including horizontal directional drilling and other methods of trenchless installation.

3.12.1. Summary

Through promoting the expansion of the oil and gas infrastructure network, EN-1 has the potential for negative effects on soils and geology across England and Wales, with specific limited negative effects identified within EN-4 associated with long distance pipelines and the effects on and of the underlying ground conditions. However, both EN-1 and EN-4 include robust mitigations which will help to reduce negative effects, principally through avoidance of sensitive areas, areas of high risk, areas of mineral resources etc. However, in some instances it may be difficult or impossible to avoid these areas, although alternative mitigation measures are available to address the issues. It is, therefore, considered that the overall effects of EN-4 are likely to be of neutral significance in the short, medium and long-term, throughout all stages of the development. As the significance is dependent on the location of the development and the sensitivity of the receiving environment, some uncertainty exists with regard to the overall significance.

3.13. Health and Well-Being

AoS Objective	Assessment (by timescale)		
	S	M	L
13. Health and Well-Being: To protect and enhance the physical and mental health of the population	0	0	0

AoS-1 identifies the potential for the following positive effects on health and wellbeing from energy infrastructure projects:

- significant positive effects from an increase in employment opportunities and enhanced economy; and
- significant positive effects from enhanced energy security and affordability, particularly a reduction in fuel poverty.

However, potential significant negative effects on human health and wellbeing were also identified, with these effects more significant during the construction period:

- disruption and annoyance effects due to noise and vibration;
- effects on health from odour, dust and air pollution;
- effects on health and wellbeing from artificial light; smoke; steam; or insect infestation; and
- effects from loss of amenity, open space, access and recreational areas.

EN-4 identifies no specific effects with regard to health and well-being, although it is recognised that underground gas storage facilities, LNG facilities and gas receptor facilities fall under the Control of Major Accident Hazards Regulations 1999, and that hazardous substances consent is required for locations storing large stocks of oil and gas. The safety of pipelines is also recognised, with the Pipelines Safety Regulations 1996 requiring that pipelines are designed, constructed and operated so that the risks are as low as is reasonably possible. Safety considerations and proximity to dwellings, workplaces and other buildings, and facilities used by the public are identified as relevant factors for consideration with LNG facilities.

The specific effects on health and well-being of EN-4 in terms of water quality and resources, noise, and landscape and visual which may also impact on health and well-being are discussed in Sections 2.9, 2.11 and 2.12 respectively.

EN-4 identifies no specific mitigation measures with regard to health and well-being.

3.13.1. Summary

Through promoting the expansion of the oil and gas infrastructure network, EN-1 has the potential for effects on health and well-being, both negative and positive, the majority of which are applicable to the kinds of infrastructure covered by EN-4. It is, therefore, considered that the overall effects of EN-4 are likely to be of neutral significance in the short, medium and long-term, throughout all stages of the development.

3.14. Equality

AoS Objective	Assessment (by timescale)		
	S	M	L
14. Equality: To encourage equality and sustainable communities.	0	0	0

AoS -1 notes that the Energy NPSs will have the following effects on equality:

- positive effects through ensuring energy security and affordability, with benefits for all socio-economic groups, but particularly for those on low incomes and hence susceptible to fuel poverty; and
- indirect positive effects due to the enhanced economic benefits and increased employment and skills opportunities likely to be created as a result of the energy NPSs.

EN-4 identifies no specific effects with regard to equality although EN-4 will contribute to the potential for positive effects through the distribution of power, the provision of security of supply and access to locally generated community facilities, services, employment opportunities, transport, education and training, public areas and other potential community benefits stated within EN-1.

EN-4 identifies no specific mitigation measures with regard to equality.

3.15. Summary

Through promoting the expansion of the oil and gas infrastructure network, EN-1 has the potential for positive effects on equality, through the distribution of power, the provision of security of supply and access to locally generated community facilities, services, employment opportunities, transport, education and training, public areas and other potential community benefits. Although EN-4 will contribute to achieving this, it is considered that the overall effects of EN-4 are likely to be of neutral significance throughout all stages of the development.

3.16. Cumulative Effects

Cumulative effects of construction (e.g. air quality, dust, noise, visual, traffic, socio-economic etc.) may arise with the development of the elements within EN-4 as most will not be developed in isolation, i.e. LNG facility + pipeline, gas receptor facility + pipeline, underground storage facility + pipeline. It is likely that both elements would be constructed within the same timeframe and connecting to each other, resulting in cumulative effects of a temporal and spatial nature. Such effects would be temporary. Similarly, cumulative effects of construction may arise in conjunction with the development of other energy technologies, particularly those contained in EN-2 where pipeline connections may be required to supply new gas or oil-fired power stations.

Cumulative effects may also arise due to location/proximity. LNG facilities and gas reception facilities within EN-4 require coastal locations, as may other energy technologies within EN-2, EN-3, EN-5 and EN-6. Cumulative effects on coastal landscapes and coastal change may arise should energy developments be concentrated in areas that provide the specific requirements of that development. Such effects would be permanent and long-term (until decommissioned), and also difficult to mitigate due to the scale of the energy developments, particularly where LNG facilities are involved.

Cumulative effects of location/proximity may also arise with the underground storage of gas, particularly those within solution mined salt caverns. The presence of suitable rocksalt strata is restricted to a small number of areas within England and Wales and, as such, underground gas storage facilities may be concentrated in specific locations.

3.17. Summary Key Findings of Appraisal

Generally, the development of gas supply infrastructure and gas and oil pipelines has similar effects to other types of energy infrastructure, although due to the linear nature of cross-country, long distance pipelines, effects are often more dispersed and spread across a wider area. Therefore, for the majority of the AoS objectives, the strategic effects of EN-4 were considered to be neutral.

Through facilitating and enabling the gas supply infrastructure necessary to support the transition to a low carbon economy and ensure security of supply, which is recognised as vital to economic prosperity and social well-being, EN-4 is considered likely to have significant positive effects of national importance on the economy and skills AoS objective in the medium-term. In the long-term, it is anticipated that the effects of EN-4 will reduce to minor positive significance as advancements in other energy technologies are likely to reduce the reliance on gas and oil and security of supply will not be of such importance. However, it is recognised that gas and oil will continue to play an important role within the UK's energy mix for some time to come.

Negative effects were identified for the short and medium-term for the landscape, townscape and visual AoS objective due to the visual nature of the above ground structures associated with gas supply infrastructure and gas and oil pipeline that EN-4 will facilitate, particularly those associated with LNG facilities which include large scale storage tanks. EN-1 and EN-4 include robust mitigations and considerations for the IPC which will help to minimise negative effects, however the residual effect may remain of some significance. Long-term effects are uncertain.

Short-term negative effects were identified for the ecological, resources and raw materials and water quality AoS objectives largely associated with the dredging requirements of LNG facilities and the disposal of the large quantities of brine generated during the solution mining of underground gas storage caverns. Short-term negative effects were also identified for the noise AoS objective associated with cross-country pipelines, where construction can lead to effects on sensitive rural communities, landscapes and biodiversity throughout the length of the pipeline.

NPS EN-4 contains a range of technology specific mitigation measures, along with those proposed in NPS EN-1, which seek to address the range of negative effects identified.

A summary of the likely significant effects arising specifically from gas supply infrastructure and gas and oil pipelines development is set out in the following table 2.1:

Table 2.1: Summary of Key AoS Findings Specific to Gas Supply Infrastructure and Gas and Oil Pipelines

AoS Objective	Assessment of non-generic effects(by timescale)		
	S	M	L
1. Climate Change	0	-?	-?
2. Ecology (Flora and Fauna)	?	?	?
3. Resources and Raw Materials	0	-?	-?
4. Economy and Skills	0	+	+
5. Flood Risk and Coastal Change	0	0	0
6. Water Quality	0	0	0
7. Traffic and Transport	0	0	0
8. Noise	0	0	0
9. Landscape, Townscape and Visual	-	-	?
10. Archaeology and Cultural Heritage	0?	0?	0?
11. Air Quality	0	0	0
12. Soil and Geology	0?	0?	0?
13. Health and Well-Being	0	0	0
14. Equality	0	0	0

4. Monitoring and next steps

4.1. Monitoring

Monitoring should be focussed upon likely significant effects that may give rise to irreversible damage, with a view to identifying trends before such damage is caused and likely significant effects where there was uncertainty in the AoS such that monitoring would enable preventative or mitigation measures to be undertaken.

A draft Monitoring Strategy for the energy NPSs and AoSs will be published alongside the main consultation documents. The Government will further develop the Monitoring Strategy during the consultation period to take into account responses received on the revised draft NPSs and AoSs. The Strategy sets out the proposed indicators for monitoring together with agreed responsibilities and frequencies of monitoring during the implementation of the NPSs. This will be summarised in the Post- Adoption Statement that will be published with the designated NPSs.

4.2. Quality Assurance Checklist

The Government's guidance on SEA contains a quality assurance checklist to help ensure that the requirements of the SEA Directive are met. This has been completed and is presented in Annex A.

4.3. Next Steps

The revised draft energy NPSs and AoS Reports will be available for consultation between 18th October 2010 and 24th January 2011. The documents are available at www.energynpsconsultation.decc.gov.uk and details of how to comment are set out in the Consultation Document.

5. Annex A: Quality Assurance Checklist

The Government's guidance on SEA[6] contains a quality assurance checklist to help ensure that the requirements of the SEA Directive are met. Those relevant to this stage have been highlighted below.

Quality Assurance Checklist	
Objectives and Context	
The plan's purpose and objectives are made clear.	**Section 1** of this AoS Report and **Section 2** of the AoS Report for EN-1.
Sustainability issues, including international and EC objectives, are considered in developing objectives and targets.	International and European objectives and targets are identified in **Annex B** and **Annex F** of AoS-1 (published separately).
SEA objectives are clearly set out and linked to indicators and targets where appropriate.	**Section 2.4** of the AoS Report for EN-1 presents the AoS objectives and Guide Questions.
Links to other related plans, programmes and policies are identified and explained.	**Annex F** of AoS-1 identifies a number of relevant plans and programmes.
Scoping	
The environmental consultation bodies are consulted in appropriate ways and at appropriate times on the content and scope of the Scoping Report.	The consultation on the Scoping Report ran for 5 weeks from the 13th February 2009 to 23rd March 2009. Two scoping workshops were also held during the scoping stage in March 2009 (one in Cardiff and one in London), to which all the consultation bodies were invited.
The SEA focuses on significant issues.	Significant issues were identified in the Scoping Report and were reiterated in **Annex F** of AoS-1**.**
Technical, procedural and other difficulties encountered are discussed; assumptions and	These were stated throughout the **Scoping Report** where appropriate, and are presented

[6] *ODPM, Scottish Executive, Welsh Assembly Government, DoENI (2005)* A Practical Guide to the Strategic Environmental Assessment Directive*, ODPM, London.*

uncertainties are made explicit.	in **Section 2.5** and **Section 2.6** of the AoS Report for EN-1.
Reasons are given for eliminating issues from further consideration.	These are stated in the **Scoping Report** as appropriate.
Alternatives	
Realistic alternatives are considered for key issues, and the reasons for choosing them are documented.	Alternatives were identified in **Section 3** of the AoS Report for EN-1. Technology-specific alternatives are presented in **Section 1.3** and are assessed in **Section 2.2** of this AoS Report.
Alternatives include 'do minimum' and/or 'business as usual' scenarios wherever relevant.	These were considered in **Section 3** of the AoS Report for EN-1.
The environmental effects (both adverse and beneficial) of each alternative are identified and compared.	Refer to **Section 3** in EN-1 for generic alternatives and to **Section 2.2** of this report for technology-specific alternatives.
Inconsistencies between the alternatives and other relevant plans, programmes or policies are identified and explained.	Refer to **Section 2.2** of this AoS report, **Section 3** of the AoS for EN-1 and the review of policies, plans and programmes in **Annex F** of AoS-1**.**
Reasons are given for selection or elimination of alternatives.	These are presented in **Section 3** of the AoS for EN-1.
Baseline Information	
Relevant aspects of the current state of the environment and their likely evolution without the plan are described.	This is set out in **Annex F** of AoS-1.
Characteristics of areas likely to be significantly affected are described, including areas wider than the physical boundary of the plan area where it is likely to be affected by the plan where practical.	Refer to **Annex F** of AoS-1.
Difficulties such as deficiencies in information or methods are explained.	These are stated throughout the report where appropriate.
Prediction and Evaluation of Significant Environmental Effects	
Effects identified include the types listed in the Directive (biodiversity, population, human health, fauna, flora, soil, water, air, climatic factors, material assets, cultural heritage and landscape) as relevant; other likely environmental effects are also covered as appropriate.	These are set out in **Annex F** of AoS-1 and **Section 3** of this AoS Report.

Both positive and negative effects are considered, and the duration of effects (short, medium, or long tem) is addressed.	This is covered in the appraisal in **Section 3** of this AoS Report and in **Annex F** of AoS-1**.**
Likely secondary, cumulative and synergistic effects are identified where practicable.	Refer to **Section 3.15** of this AoS Report and **Section 14.6** of the AoS report for EN-1.
Inter-relationships between effects are considered where practicable.	Refer to **Section 3** of this AoS Report.
The prediction and evaluation of effects makes use of relevant accepted standards, regulations and thresholds.	These are considered in the appraisal in **Annex F** of AoS-1**.**
Methods used to evaluate the effects are described.	These are described in **Section 3** of the AoS Report of EN-1.
Mitigation Measures	
Measures envisaged to prevent, reduce and offset any significant adverse effects of implementing the plan or programme are indicated.	This is presented in **Section 3** of this report and **Section 4** of the AoS of EN-1.
Issues to be taken into account in project consents are identified.	These are considered in **Section 3**.
Environmental Report	
Is clear and concise in its layout and presentation.	The layout of the AoS Report is set out in **Section 1**.
Uses simple, clear language and avoids or explains technical terms.	Abbreviations are presented in **Annex A** and technical terms are explained throughout where necessary.
Uses maps and other illustrations where appropriate.	Figures and tables have been used throughout to where appropriate.
Explains the methodology used. Explains who was consulted and what methods of consultation were used.	This is presented in **Section 4** of the AoS Report of EN-1. This is covered in **Section 1.4** of the AoS Report of EN-1.
Identifies sources of information, including expert judgement and matters of opinion.	This is covered in **Section 4** and **Annex F** of AoS-1 of the AoS Report of EN-1.
Contains a non-technical summary covering the overall approach to the SEA, the objectives of the plan, the main options considered, and any changes to the plan resulting from the SEA.	An NTS is provided seperately

Consultation	
The SEA is consulted on as an integral part of the plan-making process.	Consultation has already taken place on the Scoping Report in February and March 2009. The AoS Report will be published alongside the draft NPS for consultation.
Consultation Bodies and the public likely to be affected by, or having an interest in, the plan or programme are consulted in ways and at times which give them an early and effective opportunity within appropriate timeframes to express their opinions on the draft plan and Environmental Report.	Stakeholders have been kept engaged throughout the report's preparation and comments have been sought during designated consultation periods and workshops.
Decision-making and Information on the Decision	
The AoS Report (Environmental Report) and the opinions of those consulted are taken into account in finalising and adopting the plan or programme.	This will be included in the Post Adoption Statement (to be issued following consultation).
An explanation is given of how they have been taken into account.	This will be included in the Post Adoption Statement (to be issued following consultation).
Reasons are given for choosing the plan or programme as adopted, in the light of other reasonable alternatives considered.	This will be included in the Post Adoption Statement (to be issued following consultation).
Monitoring Measures	
Measures proposed for monitoring are clear, practicable and linked to the indicators and objectives used in the SEA.	These are presented in **Section 5** of the AoS Report of EN-1 and in **Section 4.1**.
Monitoring is used, where appropriate, during implementation of the plan or programme to make good deficiencies in baseline information in the SEA.	These are presented in **Section 5** of the AoS Report of EN-1 and in **Section 4.1**.
Monitoring enables unforeseen adverse effects to be identified at an early stage (these effects may include predictions which prove to be incorrect).	These are presented in **Section 5** of the AoS Report of EN-1 and in **Section 4.1**.
Proposals are made for action in response to significant adverse effects.	This will be set out in the Post Adoption Statement (to be published following consultation).

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