Department for Business, Energy & Industrial Strategy

APPRAISAL OF SUSTAINABILITY REPORT

Appraisal of Sustainability of the National Policy Statement for Geological Disposal Infrastructure

January 2018

Foreword

The Planning Act 2008 requires that an Appraisal of Sustainability be carried out before a National Policy Statement can be designated. This report constitutes the Appraisal of Sustainability for the draft National Policy Statement for Geological Disposal Infrastructure. Amec Foster Wheeler has undertaken the Appraisal of Sustainability on behalf of the Department for Business, Energy and Industrial Strategy, which has prepared the draft National Policy Statement.

The Appraisal of Sustainability has been undertaken in parallel with the development of the draft National Policy Statement and incorporates a Strategic Environmental Assessment. It identifies, describes and assesses the likely significant socio-economic and environmental effects of using the National Policy Statement to deliver the Government's policy of implementing geological disposal for higher level radioactive waste, as well as reasonable alternatives to the National Policy Statement approach.

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Non-Technical Summary

This Non-Technical Summary provides an overview of the Appraisal of Sustainability Report of the draft National Policy Statement for Geological Disposal Infrastructure (hereafter referred to as the 'draft National Policy Statement'). The draft National Policy Statement will apply to geological disposal facilities (GDFs) and the deep boreholes required to investigate potential sites for these facilities in England only. If circumstances were to arise requiring planning consideration of geological disposal infrastructure (i.e. GDF surface and underground facilities and investigative deep boreholes) elsewhere in the UK, planning decisions and environmental assessments would be pursued through the relevant, devolved planning system.

The following sections of this Non-Technical Summary:

- provide an overview of geological disposal and the draft National Policy Statement;
- describe the Appraisal of Sustainability process and how it has been applied to the draft National Policy Statement, including the Appraisal of Sustainability objectives and guide questions used in the appraisal;
- present a summary of the findings of the Appraisal of Sustainability of the draft National Policy Statement (and reasonable alternatives); and
- set out the next steps in the Appraisal of Sustainability process.

The Appraisal of Sustainability Report including the Non-Technical Summary has been completed by Amec Foster Wheeler Environment and Infrastructure UK Ltd on behalf of the Department for Business, Energy and Industrial Strategy (BEIS).

Geological disposal – an overview

The UK has accumulated a legacy of higher activity radioactive waste. More will arise as existing nuclear facilities are decommissioned and cleaned up, and through the operation and decommissioning of any new nuclear power stations.

In 2001, the UK Government and devolved administrations began a programme[1] to find a practical long-term management solution for the UK's higher activity radioactive waste. A wide range of options were considered by the independent Committee on Radioactive Waste Management in a process which involved extensive consultation with the public and expert groups. In July 2006, the Committee on Radioactive Waste Management recommended that geological disposal, alongside safe and secure interim storage, was the best available approach

[1] Defra, Scottish Executive, the National Assembly for Wales and DoE (NI) (2001) 'Managing Radioactive Waste Safely: Proposals for Developing a Policy for Managing Solid Radioactive Waste in the UK', available online at: http://webarchive.nationalarchives.gov.uk/20031221042814/http:/www.defra.gov.uk/environment/consult/radwaste/pdf/radwaste.pdf

for the long-term management of the UK's legacy of higher activity radioactive waste[2] (which was reiterated in a statement[3] issued by the Committee on Radioactive Waste Management in June 2013).

In October 2006, the UK Government and the devolved administrations published a response broadly accepting these recommendations[4]. Since then, the UK Government has been committed to the policy of geological disposal and favours an approach to siting a GDF that is based on the willingness of local communities to participate in the site selection process. A 2008 White Paper established a policy framework and national siting process. The 2014 White Paper 'Implementing Geological Disposal' (the '2014 White Paper')[5] set out a revised policy framework and a set of initial actions that will inform a new national siting process, including an action to define the planning process (separate to the siting process) for geological disposal facilities and related deep boreholes.

What is geological disposal?

Geological disposal involves isolating radioactive waste deep inside a suitable stable rock formation at depth to ensure that no harmful quantities of radioactivity ever reach the surface environment. This is achieved through the use of multiple barriers that work together to provide protection over hundreds of thousands of years. The multiple barriers that provide safety for geological waste disposal are a combination of the:

- form of the radioactive waste itself - for example, high level waste that arises initially as a liquid is converted into a durable, stable solid glass form before storage and disposal;
- packaging of the waste;
- engineered barriers (buffer) that protect the waste packages and limit the movement of radionuclides if they are released from the waste packages;
- engineered features of the facility that the waste packages are placed in; and
- stable geological setting (rock) in which the facility is sited.

The geological formations around the engineered facility will isolate and contain the radioactivity for a very long period, thus preventing any harmful quantities of radioactivity ever reaching the surface environment.

During the operational stage of a GDF (that is, when waste is being accepted and emplaced), waste that has been placed in a GDF could still be retrieved if required and depending on

[2] CoRWM (2006) 'Managing our Radioactive Waste Safely – CoRWM's Recommendations to Government', available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/294118/700_-_CoRWM_July_2006_Recommendations_to_Government_pdf.pdf

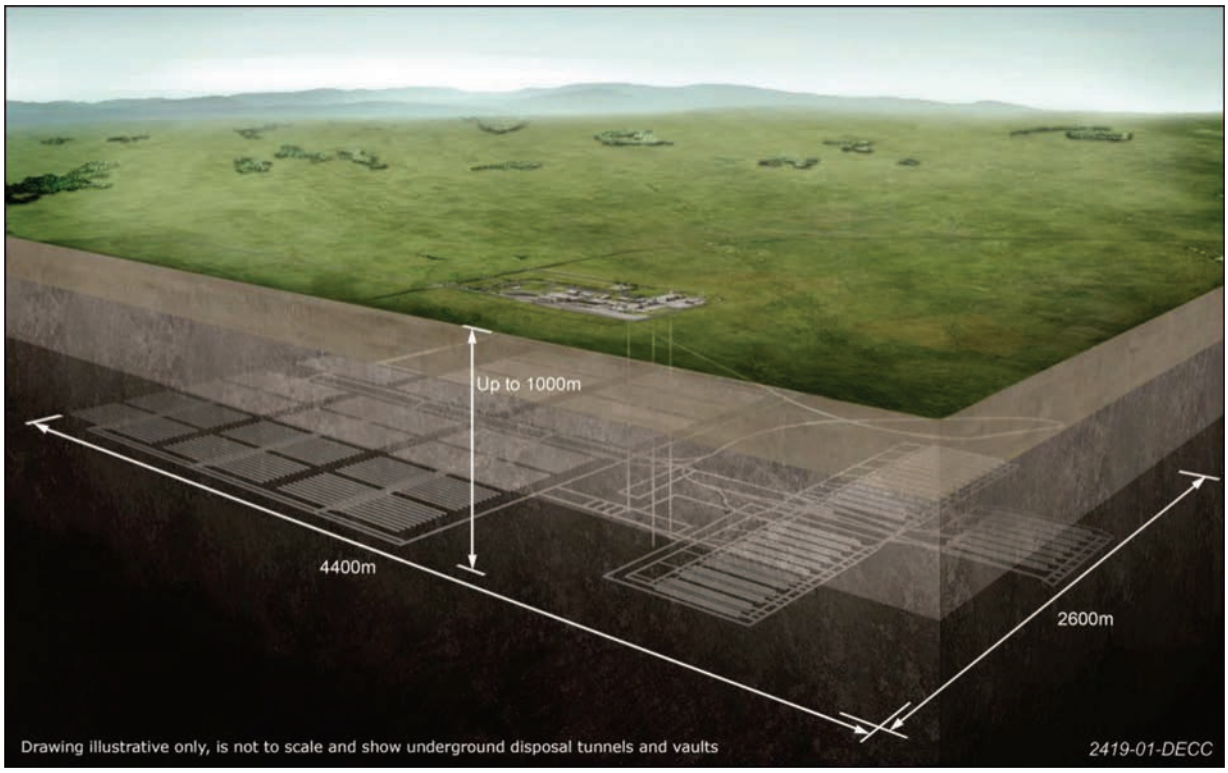
[3] CoRWM (2013) 'CoRWM Statement on Geological Disposal', CoRWM doc. 3122, Final (13 June 2013), available online at: https://www.gov.uk/government/publications/statement-on-geological-disposal

[4] Defra, Scottish Executive, the National Assembly for Wales and DoE (NI) (2006) 'Response to the Report and Recommendations from the Committee on Radioactive Waste Management (CoRWM)', available online at: http://130.88.20.21/uknuclear/pdfs/corwm-govresponse.pdf

[5] Department for Energy and Climate Change (DECC) (now BEIS) (2014), 'Implementing Geological Disposal - A framework for the long-term management of higher activity radioactive waste', available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/332890/GDF_White_Paper_FINAL.pdf

specific site circumstances. However, the purpose of a GDF is the final disposal of waste, not long-term storage of waste.

Figure 1 Illustrative diagram of a geological disposal facility



The draft National Policy Statement for Geological Disposal Infrastructure and reasonable alternatives

The draft National Policy Statement

In March 2015, the Planning Act 2008 was amended[6] to extend the categories of nationally significant infrastructure projects to include GDFs and the deep boreholes required to investigate potential sites for these facilities. In consequence, BEIS has led, in conjunction with support from other government departments and bodies, the development of a draft National Policy Statement which is now subject to consultation as required under Section 7 (2) and (4) of the Planning Act 2008.

The draft National Policy Statement is not a site-specific document and so does not identify specific locations where geological disposal infrastructure should be sited. Rather, it provides guidance for developers of geological disposal infrastructure relevant to the generic impacts of geological disposal infrastructure anywhere in England and UK territorial waters adjacent to England. It is against this guidance that development consent applications will be examined in relation to infrastructure to which the draft National Policy Statement relates.

[6] The Infrastructure Planning (Radioactive Waste Geological Disposal Facilities) Order 2015, S.I. 2015 No. 949, available online at: http://www.legislation.gov.uk/uksi/2015/949/pdfs/uksi_20150949_en.pdf

The draft National Policy Statement presents information concerning:

- the policy context on the management of higher activity radioactive waste;
- the need for geological disposal infrastructure;
- assessment principles including criteria for 'good design' and climate change adaptation; and
- generic impacts, including generic mitigation measures.

Both radioactive waste management and planning are devolved issues and the Welsh Government, Northern Ireland Executive and Scottish Government each have responsibility for these issues in or as regards their respective countries. The National Policy Statement will therefore apply to GDFs and deep borehole infrastructure projects in England and UK territorial waters adjacent to England only.

Reasonable alternatives to the draft National Policy Statement

Two reasonable alternatives to the draft National Policy Statement have been identified and considered as part of the Appraisal of Sustainability. These alternatives are as follows:

- **a non-site specific National Policy Statement that includes exclusionary criteria**: such criteria may be included on the grounds of landscape, cultural and natural heritage and nature conservation; and
- **no National Policy Statement**: an option which is based on existing national planning policy to guide the development of any future geological disposal infrastructure for higher activity wastes in England.

What is an Appraisal of Sustainability?

The Planning Act 2008[7] requires that an Appraisal of Sustainability must be carried out before a National Policy Statement can be designated. The main purpose of an Appraisal of Sustainability is to ensure that the likely environmental and socio-economic effects of the National Policy Statement, at a national level, are identified, described and evaluated. If potential significant adverse effects are identified, the Appraisal of Sustainability recommends options for avoiding or mitigating such effects. In this way, the Appraisal of Sustainability helps to inform the preparation of the National Policy Statement and supports the National Policy Statement's contribution to the achievement of sustainable development.

This Appraisal of Sustainability incorporates an assessment in accordance with the requirements of the Strategic Environmental Assessment Directive[8] and relevant implementing regulations[9] (the Strategic Environmental Assessment Regulations). The Directive aims for a high level of environmental protection and to promote sustainable development. It applies to

[7] The Planning Act 2008, available online at: http://www.opsi.gov.uk/acts/acts2008/ukpga_20080029_en_1
[8] European Union Directive 2001/42/EC on the assessment of the effects of certain plans and programmes.
[9] The Environmental Assessment of Plans and Programmes Regulations 2004 S.I. 2004 No. 1633.

certain plans that are likely to have significant effects on the environment. The Appraisal of Sustainability considers socio-economic effects in the same way as environmental effects are required to be assessed by the Strategic Environmental Assessment Directive.

In this context, the purposes of the Appraisal of Sustainability of the draft National Policy Statement are:

- to support the Secretary of State in meeting their requirements under:
  - Section 5 (3) of the Planning Act 2008 to complete an Appraisal of Sustainability of the policy within the statement; and
  - Section 10 (2) and (3) of the Planning Act 2008 to ensure that the National Policy Statement contributes to the achievement of sustainable development and for due regard to be given to the desirability of mitigating and adapting to climate change and achieving good design;
- to ensure that the likely significant environmental and socio-economic effects of the draft National Policy Statement and any reasonable alternatives are identified, characterised and appraised;
- to help identify appropriate measures to avoid, reduce or mitigate adverse effects and to enhance beneficial effects associated with the implementation of the draft National Policy Statement wherever possible;
- to provide a framework for monitoring the potential significant effects arising from the implementation of the draft National Policy Statement;
- to give the statutory consultees, stakeholders and the wider public the opportunity to review and comment upon the environmental and socio-economic effects that the draft National Policy Statement may have on them, their communities and their interests, and to encourage them to make responses and suggest improvements to the draft National Policy Statement;
- to inform the UK Government's decisions on the draft National Policy Statement; and
- to demonstrate that the draft National Policy Statement has been developed in a manner consistent with the requirements of the Strategic Environmental Assessment Directive and relevant implementing regulations.

The Appraisal of Sustainability is an assessment of the draft National Policy Statement only and does not, therefore, consider specific proposals for a GDF or related deep borehole infrastructure. However, when considering the likely significant effects that could occur as a result of the draft National Policy Statement, it does, where appropriate, draw on information from the most recent publicly available generic assessments of geological disposal infrastructure completed by Radioactive Waste Management.

The main stages for carrying out an Appraisal of Sustainability mirror those required for a Strategic Environmental Assessment and are iterative, building on evidence and consultation responses over time to inform the development of the National Policy Statement. They include:

- setting the context and objectives, establishing the baseline and deciding on the scope of the appraisal in consultation with consultees including the statutory Strategic Environmental Assessment bodies (**Stage A**);

- developing and refining alternatives, assessing the likely direct, indirect and cumulative effects of proposed and preferred options for the National Policy Statement and identifying mitigating and monitoring measures (**Stage B**);
- completing an Appraisal of Sustainability Report to present the predicted environmental and socio-economic effects of the draft National Policy Statement, including reasonable alternatives, in a form suitable for public consultation and use by decision-makers (**Stage C**);
- consulting on the draft National Policy Statement and the Appraisal of Sustainability Report (**Stage D**);
- assessing the environmental and socio-economic implications of any significant changes to the draft National Policy Statement (**Stage D**);
- providing information in a Post Adoption Statement on how the Appraisal of Sustainability Report and consultees' opinions were taken into account in deciding the final form of the National Policy Statement to be designated (**Stage D**); and
- undertaking suitable monitoring of the associated impacts of the selected options (**Stage E**).

The main outputs of the Appraisal of Sustainability are:

- the **Appraisal of Sustainability Scoping Report**, which set out the context and established the baseline conditions for the assessment and outlined the approach to the Appraisal of Sustainability of the draft National Policy Statement including the Appraisal of Sustainability objectives and guide questions. The Appraisal of Sustainability Scoping Report is available at: https://www.gov.uk/government/consultations/appraisal-of-sustainability-scoping-and-habitats-regulations-assessment-methodology-reports-for-geological-disposal-national-policy-statement;
- the **Appraisal of Sustainability Report** (the main report to which this Non-Technical Summary relates), which contains the findings of the appraisal of the environmental, social and economic effects of the draft National Policy Statement and reasonable alternatives and which is being issued for public consultation; and
- the **Appraisal of Sustainability Post Adoption Statement**, which will set out how environmental, social and economic factors, the Appraisal of Sustainability Report and consultees' opinions were taken into account in deciding the final form of the National Policy Statement.

Applying the Appraisal of Sustainability to the draft National Policy Statement

What is being appraised?

The Appraisal of Sustainability of the draft National Policy Statement has been undertaken by appraising the likely sustainability effects of implementing the draft National Policy Statement in delivering the Government's policy of geological disposal for higher level waste, with a particular focus on:

- the proposed National Policy Statement objectives set out in Section 1.10 of the draft National Policy Statement;

- the proposed assessment principles and guidance on impacts contained within Sections 4 and 5 of the draft National Policy Statement; and
- the two reasonable alternatives to the draft National Policy Statement.

How have sustainability effects been identified?

A series of Appraisal of Sustainability objectives and guide questions have been established against which the draft National Policy Statement and reasonable alternatives have been appraised. The Appraisal of Sustainability objectives and guide questions used in the appraisal of the draft National Policy Statement reflect the topics contained in Annex I of the Strategic Environmental Assessment Directive and have been informed by:

- a review of plans and programmes and the associated environmental protection objectives (see **Section 3** and **Appendix B** of the Appraisal of Sustainability Report);
- baseline information and key sustainability issues (see **Section 3** and **Appendix B**);
- a broad understanding of the likely generic effects arising from geological disposal infrastructure; and
- responses received to consultation on the initial Appraisal of Sustainability Scoping Report (see **Appendix E**).

The Appraisal of Sustainability objectives are shown in **Table 1**.

Table 1 Appraisal of Sustainability objectives and guide questions

Appraisal of Sustainability Topic Area	Appraisal of Sustainability Objectives	Guide Questions	Strategic Environmental Assessment Directive Topics
Biodiversity and Nature Conservation	1. To protect and enhance biodiversity (habitats, species and ecosystems) working within environmental capacities and limits.	• Will the Geological Disposal Infrastructure National Policy Statement protect and/or enhance internationally designated nature conservation sites e.g. Special Areas of Conservation (SACs), Special Protection Areas (SPAs) and Ramsar Sites? • Will the Geological Disposal Infrastructure National Policy Statement protect and/or enhance nationally designated nature conservation sites e.g. Sites of Special Scientific Interest (SSSIs)? • Will the Geological Disposal Infrastructure National Policy Statement affect animals or plants including protected species? • Will the Geological Disposal Infrastructure National Policy Statement protect and/or enhance priority species and habitats? • Will the Geological Disposal Infrastructure National Policy	Biodiversity Flora and Fauna

Appraisal of Sustainability Topic Area	Appraisal of Sustainability Objectives	Guide Questions	Strategic Environmental Assessment Directive Topics
		Statement affect the structure and function of natural systems (ecosystems)? • Will the Geological Disposal Infrastructure National Policy Statement affect public access to areas of wildlife interest? • Will the Geological Disposal Infrastructure National Policy Statement have an impact on fisheries?	
Population, Economics and Skills	2. To promote a strong, diverse and stable economy with opportunities for all; improve education and skills, minimise disturbance to local communities and maximise positive social impacts.	• Will the Geological Disposal Infrastructure National Policy Statement affect the social infrastructure and amenities available to local communities? • Will the Geological Disposal Infrastructure National Policy Statement affect local population demographics and/or levels of deprivation in surrounding areas? • Will the Geological Disposal Infrastructure National Policy Statement affect opportunities for investment in education and skills development? • Will the Geological Disposal Infrastructure National Policy Statement affect the number or types of jobs available in local economies? • Will the Geological Disposal Infrastructure National Policy Statement affect how diverse and robust local economies are?	Population
Human Health	3. To protect and enhance health, safety and wellbeing of workers and communities and minimise any health risks associated with disposal operations.	• Will the Geological Disposal Infrastructure National Policy Statement protect and/or enhance the health and safety of workers, or other people working at any proposed sites? • Will the Geological Disposal Infrastructure National Policy Statement protect and/or enhance the health, safety and well-being of local communities and specific groups within those communities? • Will the Geological Disposal Infrastructure National Policy Statement protect and/or enhance the health, safety and well-being of wider communities (i.e. those communities	Population Human Health

Appraisal of Sustainability Topic Area	Appraisal of Sustainability Objectives	Guide Questions	Strategic Environmental Assessment Directive Topics
		that are not host to a GDF or deep boreholes)? • Will the Geological Disposal Infrastructure National Policy Statement disproportionately affect communities already identified as vulnerable/at risk? • Will the Geological Disposal Infrastructure National Policy Statement minimise the risk or consequences of a major accident?	
Land Use, Geology and Soils	4. To conserve and enhance soil and geology and contribute to the sustainable use of land.	• Will the Geological Disposal Infrastructure National Policy Statement have an effect on soil quality/function, variety, extent and/or compaction levels? • Will the Geological Disposal Infrastructure National Policy Statement increase the risk of significant land contamination? • Will the Geological Disposal Infrastructure National Policy Statement have an effect on any known and existing contamination? • Will the Geological Disposal Infrastructure National Policy Statement protect and/or enhance Geological Conservation Sites, important geological features and geophysical processes and functions? • Will the Geological Disposal Infrastructure National Policy Statement affect land stability? • Will the Geological Disposal Infrastructure National Policy Statement change patterns of land use including effects on best and most versatile land? • Will the Geological Disposal Infrastructure National Policy Statement affect induced seismicity?	Soils
Water Quality (including surface and ground water quality and availability)	5. To maximise water efficiency, protect and enhance water quality and help achieve the objectives of the Water Framework Directive.	• Will the Geological Disposal Infrastructure National Policy Statement affect demand for water resources? • Will the Geological Disposal Infrastructure National Policy Statement affect the amount of waste water and surface runoff produced? • Will the Geological Disposal	Water

Appraisal of Sustainability Topic Area	Appraisal of Sustainability Objectives	Guide Questions	Strategic Environmental Assessment Directive Topics
		Infrastructure National Policy Statement protect and enhance the quality of surface, groundwater, estuarine and coastal water quality?	
Flood Risk and Coastal Change	6. To minimise the risks from coastal change and flooding to people, property and communities, taking into account the effects of climate change.	• Will the Geological Disposal Infrastructure National Policy Statement help to avoid development in areas of flood risk and, where possible, reduce flood risk? • Will the Geological Disposal Infrastructure National Policy Statement help to avoid development in areas affected by coastal erosion and not affect coastal processes and/or erosion rates?	Water Climatic Factors
Air	7. To minimise emissions of pollutant gases and particulates and enhance air quality, helping to achieve the objectives of the Air Quality and Ambient Air Quality and Cleaner Air for Europe Directives.	• Will the Geological Disposal Infrastructure National Policy Statement affect air quality? • Will the Geological Disposal Infrastructure National Policy Statement create a nuisance for people or wildlife (for example from dust or odours)?	Air
Noise	8. To minimise noise pollution and the effects of vibration.	• Will the Geological Disposal Infrastructure National Policy Statement help to minimise noise and vibration effects from construction and operational activities on residential amenity and effects on sensitive locations and receptors?	Human Health Fauna
Climatic Factors	9. To minimise greenhouse gas emissions as a contribution to climate change and ensure resilience to any consequences of climate change.	• Will the Geological Disposal Infrastructure National Policy Statement help to ensure a low carbon design solution to the disposal of higher activity radioactive waste, at both construction and operation phases? • Will the Geological Disposal Infrastructure National Policy Statement promote climate change adaptation (including rising temperatures and more extreme weather events)?	Climatic Factors
Waste and Resources	10. To minimise waste arisings, promote reuse, recovery and recycling, minimise the impact of wastes on the environment	• Will the Geological Disposal Infrastructure National Policy Statement affect the amount of hazardous and non-hazardous wastes produced?	Material Assets

Appraisal of Sustainability Topic Area	Appraisal of Sustainability Objectives	Guide Questions	Strategic Environmental Assessment Directive Topics
	and communities and contribute to the sustainable use of natural and material assets.	• Will the Geological Disposal Infrastructure National Policy Statement affect the capacity of existing waste management systems, both nationally and locally? • Will the Geological Disposal Infrastructure National Policy Statement maximise re-use and recycling of recovered components and materials? • Will the Geological Disposal Infrastructure National Policy Statement help achieve government and national targets for minimising, recovering and recycling waste? • Will the Geological Disposal Infrastructure National Policy Statement increase the burden on limited natural resources? • Will the Geological Disposal Infrastructure National Policy Statement make best use of existing infrastructure and resources?	
Traffic and Transport	11. To minimise the volume of traffic and promote more sustainable transport choices**.**	• Will the Geological Disposal Infrastructure National Policy Statement help to minimise traffic volumes? • Will the Geological Disposal Infrastructure National Policy Statement help to minimise the direct effects of transport such as noise and vibration, severance[10] of communities and wildlife habitats and safety concerns? • Will the Geological Disposal Infrastructure National Policy Statement encourage alternative and sustainable means of transporting freight, waste and minerals, where possible?	Biodiversity, Flora and Fauna Population Human Health
Cultural Heritage	12. To protect and where appropriate enhance the historic environment including cultural heritage resources, historic buildings and	• Will the Geological Disposal Infrastructure National Policy Statement affect designated or locally important archaeological features or their settings? • Will the Geological Disposal Infrastructure National Policy	Cultural Heritage

[10] Severance refers to the separation of communities by development such as roads.

Appraisal of Sustainability Topic Area	Appraisal of Sustainability Objectives	Guide Questions	Strategic Environmental Assessment Directive Topics
	archaeological features and their settings.	Statement affect the fabric and setting of historic buildings, places or spaces that contribute to local distinctiveness, character and appearances?	
Landscape and Townscape	13. To protect and enhance landscape and townscape quality and visual amenity.	• Will the Geological Disposal Infrastructure National Policy Statement have significant visual impacts (including those at night)? • Will the Geological Disposal Infrastructure National Policy Statement affect protected/designated landscapes or their setting? • Will the Geological Disposal Infrastructure National Policy Statement affect the intrinsic character or setting of local landscapes or townscapes? • Will the Geological Disposal Infrastructure National Policy Statement help to minimise light pollution from construction and operational activities on residential amenity and on sensitive locations and receptors? • Will the Geological Disposal Infrastructure National Policy Statement affect public access to open spaces or the countryside?	Landscape Human Health

The 6 proposed National Policy Statement objectives have been assessed by testing their compatibility with the 13 Appraisal of Sustainability objectives. This assessment has been undertaken using a compatibility matrix. The guidance on impacts and reasonable alternatives to the draft National Policy Statement have also been assessed against the 13 Appraisal of Sustainability objectives to identify likely significant environmental and socio-economic effects using an appraisal matrix. **Section 4** of the Appraisal of Sustainability Report provides further information in respect of the approach to the Appraisal of Sustainability of the draft National Policy Statement.

The purpose of a GDF is to isolate radioactive waste by preventing it from reaching the surface environment. The regulators will only accept the multiple safety cases for a GDF if they demonstrate that the facility meets their required high standards for protection of people and the environment. It is therefore reasonable to rely on the robustness of the regulatory regime to ensure effective operation of the facility. As such, the risk of incident outside normal operating conditions is considered unlikely and therefore the assessment considers the conditions in respect of the ordinary operation of a site.

What are the likely significant sustainability effects of the draft National Policy Statement and reasonable alternatives?

Table 2 summarises the likely significant sustainability effects of the guidance and mitigation contained in the draft National Policy Statement against the 13 Appraisal of Sustainability objectives, along with the performance of the reasonable alternatives.

Table 2 Summary of the likely significant effects of the draft National Policy Statement and the reasonable alternatives

Alternatives	Appraisal of Sustainability Objective												
	1. Biodiversity	2. Population	3. Human Health	4. Land Use	5. Water	6. Flood Risk and Coastal Change	7. Air	8. Noise	9. Climatic Factors	10. Waste and Resources	11. Traffic and Transport	12. Cultural Heritage	13. Landscape and Townscape
Draft National Policy Statement	+	+	+	+/?	+	+	+	+	+	+	+	+	+/?
Draft National Policy Statement including Exclusionary Criteria	++	+/?	+	+/?	+	+	++	++	+	+	+/?	++	++/?
No National Policy Statement	+/?	+/?	+/?	+/?	+/?	+/?	+/?	+/?	+/?	+/?	+/?	+/?	+/?

Key to appraisal of likely significant effects

Symbol	Likely Significant Effect on the Appraisal of Sustainability Objective
++	The draft National Policy Statement is likely to have a significant positive effect on the Appraisal of Sustainability objective.
+	The draft National Policy Statement is likely to have a positive effect on the Appraisal of Sustainability objective.
0	The draft National Policy Statement is likely to have a neutral effect on the Appraisal of Sustainability objective.
?	Effects are uncertain/there is insufficient information on which to determine effect.
-	The draft National Policy Statement is likely to have a negative effect on the Appraisal of Sustainability objective.
--	The draft National Policy Statement is likely to have a significant negative effect on the Appraisal of Sustainability objective.

Draft National Policy Statement

The construction, operation and decommissioning/closure of geological disposal infrastructure could have a wide range of socio-economic and environmental impacts. Due to the depth of the underground elements of a GDF (which would be at depths of between 200 metres and 1,000 metres), these impacts would be predominantly associated with the development of surface facilities. By providing policy and guidance to nationally significant infrastructure project

developers, the Examining Authority and the Secretary of State, the draft National Policy Statement will help to ensure that these impacts are identified, appropriately assessed and, where necessary, avoided, minimised or mitigated.

The guidance contained in the draft National Policy Statement including the assessment principles may also help to ensure that benefits associated with the development of geological disposal infrastructure are realised. These benefits may include, for example, the delivery of legacy benefits to host communities related to the provision of community infrastructure and services or environmental improvements such as habitat enhancement. In this regard, the draft National Policy Statement makes clear that the Secretary of State should consider whether appropriate requirements should be attached to any consent, or included in any planning obligations entered into, in order to ensure that mitigation and enhancement measures are delivered.

Whilst the principle of geological disposal of higher activity radioactive waste has already been established[11] and is therefore not the subject of this Appraisal of Sustainability, by providing a clear framework for decisions relating to geological disposal infrastructure the draft National Policy Statement will support the delivery of a GDF in a timely manner. This will help to ensure the safe and secure management of the UK's higher activity radioactive waste in the long term.

Overall, the draft National Policy Statement has been assessed as having long-term, permanent positive effects across all of the Appraisal of Sustainability objectives. No negative effects (significant or minor) have been identified although there is the potential for positive effects associated with the implementation of the draft National Policy Statement to be enhanced.

Draft National Policy Statement including exclusionary criteria

Effects on the Appraisal of Sustainability objectives associated with this reasonable alternative are expected to be broadly similar to those identified in respect of the draft National Policy Statement above. However, the setting of clear parameters for siting which excludes specific environmental and cultural assets would be likely to provide greater certainty in respect of the location of geological disposal infrastructure and could help to reduce the likelihood that adverse impacts on these assets would occur. In consequence, this reasonable alternative has been assessed as having a significant long-term and permanent positive effect on Appraisal of Sustainability Objective 1 (Biodiversity and Nature Conservation), Appraisal of Sustainability Objective 12 (Cultural Heritage) and Appraisal of Sustainability Objective 13 (Landscape and Townscape). This reasonable alternative may also generate additional, indirect positive effects on a number of the other Appraisal of Sustainability objectives by helping to avoid adverse impacts on, for example, water quality and resources in excluded areas. In this regard, positive effects on Appraisal of Sustainability Objective 7 (Air) and Appraisal of Sustainability Objective 8 (Noise) have been assessed as significant.

[11] DECC (now BEIS) (2014), 'Implementing Geological Disposal - A framework for the long-term management of higher activity radioactive waste', available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/332890/GDF_White_Paper_FINAL.pdf

Notwithstanding the benefits outlined above, the adoption of exclusionary criteria may not necessarily exclude the possibility of adverse effects occurring (although the general risk of adverse effects is assumed to be reduced). In particular, adverse effects could still arise if geological disposal facilities were sited adjacent or close to the boundary of a designated site or asset. In addition, the adoption of exclusionary criteria could result in unintended effects arising from increased development pressure on areas that, whilst not designated, may be sensitive to development (for example, areas at risk of flooding) or have value in terms of, for example, the economy or mineral resources.

Geological considerations are critical to ensuring that there are effective barriers with no conceivable pathways from the facility to the surface. The Government does not wish to foreclose future possible locations that could be more advantageous in addressing safety over the lifetime of the facility.

Furthermore, the sensitivity of designated areas varies considerably and many of the potential effects of infrastructure developments can be mitigated by good design and planning. Given this, it may well be possible to develop infrastructure in these areas without an unacceptable environmental impact, as has occurred in some circumstances previously in National Parks and World Heritage Sites (and as described in **Section 2** of this Appraisal of Sustainability report). Exclusion of these areas could also reduce the scope of community engagement and unnecessarily exclude communities in these areas from the potential socio-economic benefits of hosting a GDF.

The planning process already provides protection for designated areas as described in Chapter 5 of the draft National Policy Statement; these issues will be examined at the site-specific stage when both the potential impacts and the effectiveness of their mitigation can best be judged. Therefore, the Government considers that broad exclusionary criteria are not necessary to achieve the goal of ensuring that the environment is suitably protected, as site-specific examination may show it is possible to develop infrastructure in these areas without an unacceptable impact on people or the environment. Furthermore, the Government wants to ensure that the separate siting process has sufficient flexibility to identify the safest location for a GDF over the lifetime of the facility

The Government considers that applying exclusionary criteria would risk prematurely excluding some areas from detailed consideration and, as a consequence, compromising the Government's ability to ensure that geological disposal infrastructure is sited in a geologically suitable environment to provide a long-term, secure, safe and sustainable solution for the disposal of higher activity waste. In addition, it may be possible to develop geological disposal infrastructure in designated areas without an unacceptable impact on people or the environment. **In consequence, whilst this alternative has been assessed as having a positive effect across the majority of the Appraisal of Sustainability objectives, the adoption of exclusionary criteria is not deemed to be appropriate or necessary.**

No National Policy Statement

Under this alternative, it is assumed that proposals for geological disposal infrastructure would still come forward and would be determined by the Secretary of State as a nationally significant infrastructure project in accordance with the Planning Act 2008 (as amended). In the absence of a National Policy Statement, applications would be subject to the provisions of national planning policy and the Environmental Impact Assessment Regulations as well as legislation in respect of, for example, the protection of international and national habitats and species, cultural heritage, air quality and contaminated land. Alongside policy and guidance contained in other plans and programmes (such as local plans, marine plans and flood risk management plans), this would be expected to help ensure that socio-economic and environmental impacts associated with the development of geological disposal infrastructure are identified, assessed and minimised/mitigated.

Issues relating to discharges or emissions which affect air quality, water quality, land quality and the marine environment (or which include noise and vibration) would be subject to separate regulation under the pollution control framework or other consenting or licensing regimes. Any activities within the development that are regulated under those regimes will need to obtain the relevant permissions before the activities can be undertaken. Geological disposal infrastructure (including deep investigative boreholes and the GDF itself) will also require environmental permits from the Environment Agency under the Environmental Permitting (England and Wales) Regulations 2016. These existing regulatory controls will help to ensure that environmental impacts associated with the development of geological disposal infrastructure are acceptable.

The independent Office for Nuclear Regulation is responsible for the safety and security regulation of the nuclear sector across the UK. A GDF will be a nuclear installation under the Nuclear Installations Act 1965 and, as such, it will be the Office for Nuclear Regulation's role to ensure that, prior to construction of a GDF, a licensing process is in place such that the Office for Nuclear Regulation can consider the granting of a licence for the site, with the requisite site licence conditions attached, and enforce the requirements of that licence. The Office for Nuclear Regulation will also be responsible for advice, assessment of the licensee's security, and approving security arrangements for the geological disposal facility, and for securing compliance with those arrangements.

Under this alternative, proposals for geological disposal infrastructure would still be consistent with Council Directive 2011/70/Euratom (which broadly accepts that deep geological disposal represents the safest and most sustainable option as the end point of the management of high-level waste) and would still be determined as nationally significant infrastructure projects in accordance with the Planning Act 2008. However, the absence of a clear framework for decisions relating to geological disposal infrastructure would lead to increased uncertainty in respect of the timely delivery of a GDF to ensure the safe and secure management of the UK's higher activity radioactive waste in the long term.

Despite the policy and legislative framework outlined above, the absence of a clear statement regarding the full range of considerations to be taken into account by the applicant and Secretary of State (as proposed in the draft National Policy Statement) risks inconsistency in

interpretation, particularly at a project level. It may also result in opportunities for the mitigation of adverse impacts and enhancement of benefits being missed. Finally, the absence of a clear framework for decisions relating to geological disposal infrastructure would lead to increased uncertainty in respect of the timely delivery of a GDF. **In consequence, whilst this alternative has been assessed as having a positive effect across the majority of the Appraisal of Sustainability objectives, a higher degree of uncertainty persists.**

Summary

Overall, the designation of the draft National Policy Statement as proposed would ensure that planning decisions in respect of geological disposal infrastructure take into account the full range of socio-economic impacts associated with geological disposal infrastructure development and that they are expedient, timely, predictable and accountable and are predicated on the need for the infrastructure having been established. The draft National Policy Statement provides sufficient flexibility in siting to ensure that geological disposal infrastructure is located in suitable geological environments to support safety and security whilst not prejudging the siting process. This will support the UK Government's policy of geological disposal of higher activity radioactive waste. **In consequence, the draft National Policy Statement as proposed is being taken forward for consultation.**

What are the main recommendations of the Appraisal of Sustainability?

Based on the appraisal of the draft National Policy Statement (as proposed), measures have been identified to enhance the sustainability of the document. These measures are included within each of the topic-based assessments in **Appendix B** and are collated in **Appendix C** and summarised in **Section 5**.

A number of measures to enhance the draft National Policy Statement cut across several of the Appraisal of Sustainability objectives and draft National Policy Statement topics. These cross-cutting measures predominantly relate to the impacts contained in Chapter 5 of the draft National Policy Statement and include:

- the inclusion of direct reference to the Planning Practice Guidance;
- the need for further guidance in respect of when the Secretary of State should refuse consent in the context of water and waste; and
- the potential for greater specificity in terms of the suite of measures that could be implemented to address impacts during the key stages of the project life cycle (construction, operation and decommissioning/closure).

Based on the findings of the Appraisal of Sustainability, it is also considered that the guidance contained in the 'Applicant's Assessment' sub-sections of Chapter 5 could make more explicit the requirements in respect of the content and scope of an Environmental Statement (as required). Such guidance would go beyond reference to the Planning Practice Guidance and Schedule 4 of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 to reflect the issues relevant to the GDF related nationally significant infrastructure

projects and to ensure consistency across each of the impacts considered in Chapter 5. This guidance could cover (for each topic):

- the broad scope and methodology for assessment including reference to relevant guidance and thresholds of significance (recognising that the scope of an Environmental Statement will be fully determined at the project stage);
- the identification and characterisation of existing baseline conditions (and their evolution without the proposed geological disposal infrastructure);
- the identification, description and assessment of effects (including the determination of whether any effects would be significant and also including the consideration of any cumulative effects);
- any mitigation and enhancement measures (as necessary); and
- any relevant proposed monitoring arrangements.

Further recommendations relating to the scope of an Environmental Statement in respect of individual topics are detailed in **Appendix C** and summarised in **Section 5**.

How will the sustainability effects of implementing the draft National Policy Statement be monitored?

Once the National Policy Statement is designated, its socio-economic and environmental effects will need to be monitored. Monitoring the socio-economic and environmental effects of the implementation of the draft National Policy Statement can help to answer questions such as:

- Were the Appraisal of Sustainability predictions of effects accurate?
- Is the National Policy Statement contributing to the achievement of the Appraisal of Sustainability objectives?
- Are mitigation measures performing as well as expected?
- Are there any unforeseen adverse effects? Are these within acceptable limits, or is remedial action desirable?

For the 13 topics considered in this Appraisal of Sustainability, it is proposed that monitoring should focus on the indicators and sources of information set out in **Table 3**.

Table 3 Potential monitoring indicators

Topic Area	Potential Indicator(s)	Possible Source(s) of Information
Biodiversity and Nature Conservation	Annual (where information allows) trends in: • condition of designated sites; • threatened habitats and species; • populations of countryside birds; and • surface water biological indicators in locations at or adjacent to deep borehole and GDF development sites. Implementation of construction management plans. Implementation of biodiversity enhancement measures.	Joint Nature Conservation Committee Department for Environment, Food and Rural Affairs (Defra) Environment Agency Natural England Natural Resources Wales Scottish Natural Heritage Developer

Topic Area	Potential Indicator(s)	Possible Source(s) of Information
Population, Economics and Skills	Annual (where information allows) trends in: • number of construction workers employed at geological disposal infrastructure sites; • employment activity and unemployment rates in locations hosting geological disposal infrastructure; • business counts in locations hosting geological disposal infrastructure; • local jobs creation associated with the development of geological disposal infrastructure; • training and apprenticeship opportunities generated by geological disposal infrastructure development; • Gross Value Added[12] associated with construction and operation of geological disposal infrastructure; • investment in local community facilities and services associated with geological disposal infrastructure; and • deprivation at locations hosting geological disposal infrastructure.	Developer Office for National Statistics
Human Health	Annual (where information allows) trends in: • monitoring of noise levels at development sites and along transport routes to/from the deep borehole and GDF construction site(s); • number of nuisance complaints received related to GDF activity; • air quality at development sites and along key transport routes from/to the deep borehole and GDF construction site(s); • GDF worker accidents; and • health deprivation and inequalities at locations hosting geological disposal infrastructure. Implementation of construction management plans at deep borehole and GDF construction sites.	Developer Local Planning Authority Public Health England Office for National Statistics
Land Use, Geology and Soils	Annual (where information allows) trends in: • loss of best and most versatile agricultural land as result of the development of geological disposal infrastructure; • area of vegetation and soil layers cleared to support geological disposal infrastructure; • remediation of contaminated land in support of geological disposal infrastructure; • incidences of land contamination at geological disposal infrastructure sites; and • condition of Geological Conservation Review sites in locations adjacent to geological disposal	Developer Local Planning Authority Natural England

[12] Gross Value Added is the measure of the value of goods and services produced in an area, industry or sector of an economy.

Topic Area	Potential Indicator(s)	Possible Source(s) of Information
	infrastructure. Implementation of construction management plans at deep boreholes and GDF construction sites.	
Water Quality (including surface and ground water quality and availability)	Annual (where information allows) trends in: • groundwater quality monitoring; • surface water quality monitoring; • volumes of water consumption; and • consented/permitted discharges at GDF development sites and linked waterbodies.	Developer Environment Agency Natural Resources Wales Scottish Environment Protection Agency Relevant water companies
Flood Risk and Coastal Change	Annual (where information allows) trends in: • the extent of geological disposal infrastructure in Flood Zones 2 and 3[13]; • flood risk adjacent to geological disposal infrastructure sites; • incidents of flooding affecting geological disposal infrastructure; and • investment in flood risk defences associated with geological disposal infrastructure development.	Developer Environment Agency Local Planning Authority
Air	Annual (where information allows) trends in: • air quality monitoring (including nitrogen oxides, hydrocarbons, carbon monoxide, particulate matter, methane, sulphur dioxide, radon, volatile organic compounds (and ozone) at GDF development sites and along key transport routes to/from the deep borehole and GDF construction site(s); and • traffic activity levels around GDF development sites (annual average daily traffic flows). Implementation of construction management plans at deep borehole and GDF construction sites.	Developer Local Planning Authority Public Health England
Noise	Annual (where information allows) trends in: • monitoring of noise levels at GDF development sites and along transport routes from/to the deep borehole and GDF construction site(s); and • number of nuisance complaints received related to GDF activity. Implementation of construction management plans at deep borehole and GDF construction site(s).	Developer Local Planning Authority
Climatic Factors	Annual (where information allows) trends in: • energy consumption associated with the development of geological disposal infrastructure; and	Developer

[13] Land identified by the Environment Agency as having either a medium or high probability of flooding. Flood Zone 2 defined as land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. Flood Zone 3 defined as land having a 1 in 100 or greater annual probability of river flooding; or land having a 1 in 200 or greater annual probability of sea flooding.

Topic Area	Potential Indicator(s)	Possible Source(s) of Information
	• emissions of greenhouse gases associated with geological disposal infrastructure development.	
Waste and Resources	Annual (where information allows) trends in: • volume of construction waste and proportions recycled; • volume of hazardous waste; • volume of controlled wastes and proportions recycled; • volumes of wastewater; and • raw materials used associated with deep borehole and GDF development. Annual (where information allows) trends in volumes of higher activity radioactive waste deposited in a GDF. Implementation of Site Waste Management Plans.	Developer Environment Agency Relevant Waste Planning Authorities
Traffic and Transport	Annual (where information allows) trends in: • traffic activity levels around GDF development sites (annual average daily traffic flows); • proportion of GDF workers using sustainable modes of transport; and • investment in transportation infrastructure and public transport services associated with geological disposal infrastructure. Implementation of GDF Staff Travel Plans.	Developer Highways Authority
Cultural Heritage	Annual (where information allows) trends in: • % of heritage assets of different types that are at risk at or adjacent to geological disposal infrastructure development sites; • loss of, or damage to, heritage assets and their settings as a result of GDF development; and • the impact of GDF development on the significance of historic assets in locations at or adjacent to geological disposal infrastructure development sites.	Historic England Cadw (Welsh Government historic environment service) Historic Environment Scotland Local Planning Authority
Landscape and Townscape	Annual (where information allows) trends in development of geological disposal infrastructure in National Parks and Areas of Outstanding Natural Beauty (AONBs). Implementation of landscape enhancement measures as part of geological disposal infrastructure development.	Developer Local Planning Authority (including National Park authorities)

What are the next steps?

The Appraisal of Sustainability Report and this Non-Technical Summary are presented for consultation. Feedback received from consultees will be documented and considered in reviewing the proposals for the draft National Policy Statement. A Post Adoption Statement will summarise how the Appraisal of Sustainability and the consultation responses have been taken

into account and how socio-economic and environmental considerations have been integrated into the final decisions regarding the National Policy Statement.

How to give us your views

We would welcome your views on any aspect of this Appraisal of Sustainability Report, which can be provided by responding to the consultation questions in the separate consultation document titled ‘Consultation - National Policy Statement for Geological Disposal Infrastructure’.

1. Introduction

Overview

1.1. The 2014 White Paper 'Implementing Geological Disposal' (the '2014 White Paper')[14] set out the UK Government's intention to amend the Planning Act 2008[15] to bring Geological Disposal Facilities (GDFs) for radioactive waste, and the deep boreholes[16] required to investigate potential sites for these facilities, within the definition of nationally significant infrastructure projects in England and UK territorial waters adjacent to England, and to designate a National Policy Statement (NPS) to guide future decision making. The Infrastructure Planning (Radioactive Waste Geological Disposal Facilities) Order 2015[17], which came into force on the 27 March 2015, amended the Planning Act 2008 to extend the categories of nationally significant infrastructure projects to include development relating to geological disposal. In consequence, a draft NPS for Geological Disposal Infrastructure (as defined by Section 30A of the Planning Act 2008), has been developed by the Department for Business, Energy and Industrial Strategy (BEIS) as part of its work in managing the UK nuclear legacy and radioactive waste safely and cost effectively.

1.2. The purpose of the NPS for Geological Disposal Infrastructure will be to guide the Secretary of State and the Planning Inspectorate in considering, and the developer of the site in preparing, any applications for development consent in relation to geological disposal nationally significant infrastructure projects, including deep boreholes. Once the NPS has been designated, the Secretary of State will be required to determine any applications for development consent in accordance with it, unless certain other criteria (set out in the Planning Act 2008) apply. The NPS is non-site specific and provides the high level assessment principles against which development consent order applications will be considered. In this regard, the proposed NPS will be similar to the other non-nuclear energy infrastructure NPSs already designated by BEIS[18].

1.3. Before designating a NPS, Section 5(3) of the Planning Act 2008 requires that the Secretary of State carry out an Appraisal of the Sustainability (AoS) of the policy set out in the statement. The AoS ensures that the likely environmental and socio-economic effects of the NPS are identified, described and evaluated. The AoS also satisfies the requirements of Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment (commonly referred to as the Strategic

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[14] Department for Energy and Climate Change (DECC) (now BEIS) (2014), 'Implementing Geological Disposal - A framework for the long-term management of higher activity radioactive waste', available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/332890/GDF_White_Paper_FINAL.pdf

[15] The Planning Act 2008, available online at: http://www.opsi.gov.uk/acts/acts2008/ukpga_20080029_en_1

[16] Deep boreholes are for site investigation only and do not refer to any proposals for deep borehole disposal of radioactive waste.

[17] The Infrastructure Planning (Radioactive Waste Geological Disposal Facilities) Order 2015, S.I. 2015 No. 949, available online at: http://www.legislation.gov.uk/uksi/2015/949/pdfs/uksi_20150949_en.pdf

[18] Energy NPSs designated on 19th July 2011. Non-nuclear covers EN-1 Overarching Energy NPS to EN-5 Electricity Networks Infrastructure NPS, available online at: https://www.gov.uk/government/publications/national-policy-statements-for-energy-infrastructure

Environmental Assessment (SEA) Directive) and relevant implementing regulations[19] (the SEA Regulations).

Purpose of this report

1.4. This report presents the findings of the AoS of the draft NPS for Geological Disposal Infrastructure (hereafter referred to as the 'draft NPS'). The purposes of the AoS of the draft NPS are:

- to support the Secretary of State in meeting his requirements under:
  - Section 5 (3) of the Planning Act 2008 to complete an AoS of the policy within the statement; and
  - Section 10 (2) and (3) of the Planning Act 2008 to ensure that the NPS contributes to the achievement of sustainable development and for due regard to be given to the desirability of mitigating and adapting to climate change and achieving good design;
- to ensure that the likely significant environmental and socio-economic effects of the draft NPS and any reasonable alternatives are identified, characterised and appraised;
- to help identify appropriate measures to avoid, reduce or mitigate adverse effects and to enhance beneficial effects associated with the implementation of the draft NPS wherever possible;
- to provide a framework for monitoring the potential significant effects arising from the implementation of the draft NPS;
- to give the statutory consultees, stakeholders and the wider public the opportunity to review and comment upon the environmental and socio-economic effects that the draft NPS may have on them, their communities and their interests, and to encourage them to make responses and suggest improvements to the draft NPS;
- to inform the UK Government's decisions on the draft NPS; and
- to demonstrate that the draft NPS has been developed in a manner consistent with the requirements of the SEA Directive and relevant implementing regulations.

1.5. The AoS is an assessment of the draft NPS only and does not, therefore, consider specific proposals for geological disposal infrastructure (i.e. GDF surface and underground facilities and investigative deep boreholes). However, when considering the likely significant effects that could occur as a result of the draft NPS, it does, where appropriate, draw on information from the most recent publicly available generic assessments of geological disposal infrastructure completed by Radioactive Waste Management Limited (RWM).

1.6. The assessment and AoS Report have been completed by Amec Foster Wheeler Environment and Infrastructure UK Ltd (Amec Foster Wheeler) on behalf of BEIS.

[19] The Environmental Assessment of Plans and Programmes Regulations 2004 S.I. 2004 No. 1633.

Geological disposal – an overview

1.7. The UK has accumulated a legacy of higher activity radioactive waste. More will arise as existing nuclear facilities are decommissioned and cleaned up, and through the operation and decommissioning of any new nuclear power stations.

1.8. In 2001, the UK Government and devolved administrations began a programme[20] to find a practical long-term management solution for the UK's higher activity radioactive waste. A wide range of options were considered by the independent Committee on Radioactive Waste Management (CoRWM) in a process which involved extensive consultation with the public and expert groups. In July 2006, CoRWM recommended that geological disposal, alongside safe and secure interim storage, was the best available approach for the long-term management of the UK's legacy of higher activity radioactive waste[21]. In June 2013, CoRWM issued a statement reiterating its commitment to geological disposal.

1.9. Since then, the UK Government has been committed to the policy of geological disposal and favours an approach to siting a GDF that is based on the willingness of local communities to participate in the siting process. A 2008 White Paper established a policy framework and national siting process. The 2014 White Paper[22] set out a revised policy framework and a set of initial actions that will inform a new national siting process.

What is geological disposal?

1.10. Geological disposal involves disposal of solid radioactive waste in a disposal facility located underground in a stable geological formation in order to provide long-term containment of the waste and its isolation from the surface environment. Containment is achieved through the use of multiple barriers that work together to provide protection over hundreds of thousands of years. The multiple barriers that provide safety for geological waste disposal are a combination of the:

- form of the radioactive waste itself - for example, high level waste that arises initially as a liquid is converted into a durable, stable solid glass form before storage and disposal;
- packaging of the waste;
- engineered barriers (buffer) that protect the waste packages and limit the movement of radionuclides if they are released from the waste packages;
- engineered features of the facility that the waste packages are placed in; and

[20] Defra, Scottish Executive, the National Assembly for Wales and DoE (NI) (2001) 'Managing Radioactive Waste Safely: Proposals for Developing a Policy for Managing Solid Radioactive Waste in the UK', available online at: http://webarchive.nationalarchives.gov.uk/20031221042814/http:/www.defra.gov.uk/environment/consult/radwaste/pdf/radwaste.pdf

[21] CoRWM (2006) 'Managing our Radioactive Waste Safely – CoRWM's Recommendations to Government', available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/294118/700_-_CoRWM_July_2006_Recommendations_to_Government_pdf.pdf

[22] DECC (now BEIS) (2014), 'Implementing Geological Disposal - A framework for the long-term management of higher activity radioactive waste', available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/332890/GDF_White_Paper_FINAL.pdf

- stable geological setting (rock) in which the facility is sited.

1.11. The geological formations around the engineered facility will isolate and contain the radioactivity for a very long period, thus preventing any harmful quantities of radioactivity ever reaching the surface environment.

1.12. During the operational stage of a GDF (that is, when waste is being accepted and emplaced), waste that has been placed in a GDF could still be retrieved if required and depending on specific site circumstances. However, the purpose of a GDF is the final disposal of waste, not long-term storage of waste.

National Policy Statement for Geological Disposal Infrastructure

1.13. In March 2015, the Infrastructure Planning (Radioactive Waste Geological Disposal Facilities) Order 2015[23] amended the Planning Act 2008 to extend the categories of nationally significant infrastructure projects to include GDFs and the deep boreholes required to investigate potential sites for these facilities (collectively termed geological disposal infrastructure for the purposes of this report). In consequence, BEIS has led, in conjunction with support from other government departments and bodies, the development of a draft NPS which is now subject to consultation as required under Section 7 (2) and (4) of the Planning Act 2008.

1.14. The draft NPS sets out the need for geological disposal infrastructure for higher activity radioactive waste in England and the Government's approach to delivering it. It provides planning guidance for developers of geological disposal infrastructure. Geological disposal infrastructure includes both GDFs and associated deep boreholes.

1.15. The NPS will be used as the primary basis for the examination by the Examining Authority, and for decisions by the Secretary of State, on development consent applications for geological disposal infrastructure that fall within the definition of a nationally significant infrastructure project as defined in the Planning Act 2008 (as amended) [24].

1.16. The NPS is not a site-specific document and so does not identify specific locations where geological disposal infrastructure should be sited, but rather provides guidance relevant to the generic impacts of geological disposal infrastructure anywhere in England. The draft NPS presents information concerning:

- the policy context on the management of higher activity radioactive waste;
- the need for geological disposal infrastructure;
- assessment principles including criteria for 'good design' and climate change adaptation; and
- generic impacts, including generic mitigation measures.

1.17. Both radioactive waste management and planning are devolved issues and the Welsh Government, Northern Ireland Executive and Scottish Government each have

[23] The Infrastructure Planning (Radioactive Waste Geological Disposal Facilities) Order 2015, S.I. 2015 No. 949, available online at: http://www.legislation.gov.uk/uksi/2015/949/pdfs/uksi_20150949_en.pdf
[24] The Planning Act 2008, available online at: http://www.opsi.gov.uk/acts/acts2008/ukpga_20080029_en_1

responsibility for these issues in or as regards their respective countries. The NPS will therefore apply to GDFs and deep borehole infrastructure projects in England only.

Appraisal of Sustainability (AoS) and Strategic Environmental Assessment (SEA)

The requirement for an AoS of the National Policy Statement for Geological Disposal Infrastructure

1.18. Section 5(3) of the Planning Act 2008 requires that an AoS must be carried out before an NPS can be designated. The main purpose of an AoS is to examine the likely social, economic and environmental effects of designating the NPS. If potential significant adverse effects are identified, the AoS recommends options for avoiding or mitigating such effects. In this way, the AoS helps inform the preparation of the NPS and supports the NPS's contribution to the achievement of sustainable development.

Relationship between AoS and SEA

1.19. The Government has determined that the AoS of this NPS, required under the Planning Act 2008, should incorporate an assessment in accordance with the requirements of the SEA Directive and relevant implementing regulations[25] to ensure that environmental considerations are taken into account. The Directive aims for a high level of environmental protection and to promote sustainable development and applies to certain plans that are likely to have significant effects on the environment. The draft NPS is being treated as a plan for the purpose of the SEA Directive.

1.20. The AoS considers socio-economic and environmental effects in the same way as environmental effects are required to be assessed by the SEA Directive.

Stages of the AoS process

1.21. The main stages of AoS mirror those of SEA and are iterative, building on evidence and consultation responses over time to inform the development of the NPS. They include:

- setting the context and objectives, establishing the baseline and deciding on the scope of the appraisal in consultation with consultees including the statutory SEA bodies (**Stage A**);
- developing and refining alternatives, assessing the likely direct, indirect and cumulative effects of proposed options and identifying mitigating and monitoring measures (**Stage B**);
- completing an AoS Report to present the predicted environmental and socio-economic effects of the draft NPS, including alternatives, in a form suitable for public consultation and use by decision-makers (**Stage C**);
- consulting on the draft NPS and the AoS Report (**Stage D**);
- assessing the environmental and socio-economic implications of any significant changes to the draft NPS (**Stage D**);

[25] The Environmental Assessment of Plans and Programmes Regulations 2004 S.I. 2004 No. 1633.

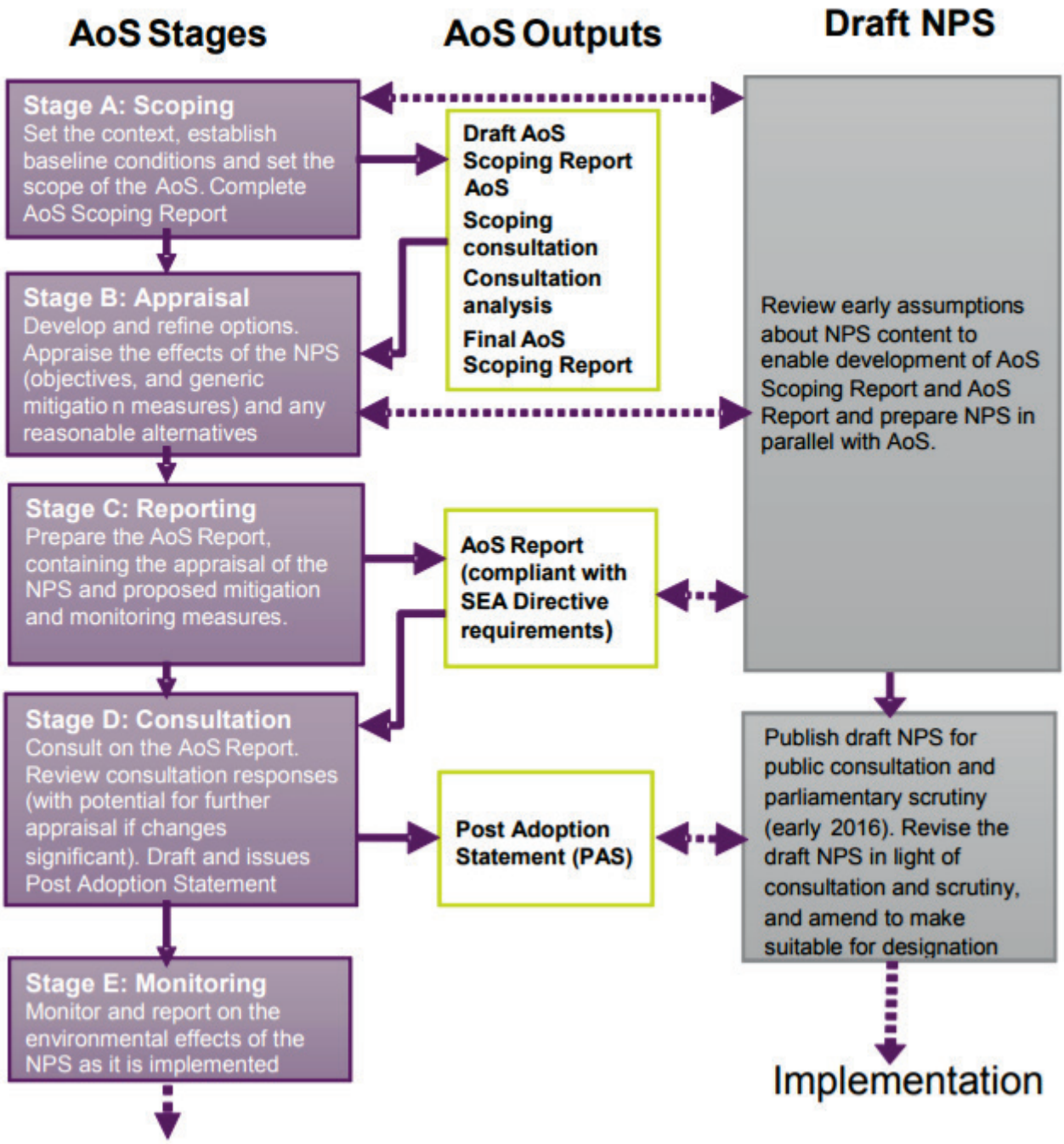
- providing information in a Post Adoption Statement on how the AoS Report and consultees' opinions were taken into account in deciding the final form of the NPS to be designated (**Stage D**); and
- undertaking suitable monitoring of the associated impacts of the selected options (**Stage E**).

1.22. The main outputs of the AoS are:

- the **AoS Scoping Report**, which set out the context and established the baseline conditions for the assessment and outlined the approach to the AoS of the draft NPS including the appraisal objectives and guide questions. The AoS Scoping Report is available at: https://www.gov.uk/government/consultations/appraisal-of-sustainability-scoping-and-habitats-regulations-assessment-methodology-reports-for-geological-disposal-national-policy-statement;
- the **AoS Report** (this report), which contains the findings of the appraisal of the environmental, social and economic effects of the draft NPS and which will be issued for public consultation; and
- the **AoS Post Adoption Statement**, which will set out how environmental, social and economic factors, the AoS Report and consultees' opinions were taken into account in deciding the final form of the NPS.

1.23. The key AoS stages are shown in **Figure 1.1** together with links to the draft NPS process.

Figure 1.1 Linking the AoS and draft NPS



Note: These stages are based on guidance contained in Office of the Deputy Prime Minister (now the Department for Communities and Local Government) (2005) guidance[26].

[26] Office of the Deputy Prime Minister (ODPM) (now the Department for Communities and Local Government (DCLG)) (2005) 'A Practical Guide to the Strategic Environmental Assessment Directive', available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/7657/practicalguidesea.pdf
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/7657/practicalguidesea.pdf

1.24. A draft (initial) Scoping Report was completed and a technical consultation on the report took place between 4 August 2015 and 25 September 2015 (**Stage A** highlighted above). The report was amended to take account of the responses received as appropriate and a Final Scoping Report was issued (on 1 February 2016).

1.25. The revised appraisal framework (comprising AoS objectives and guide questions) has then been used to appraise the socio-economic and environmental effects of the draft NPS as well as the reasonable alternatives to the NPS (**Stage B**). This has been an iterative process alongside the development of the draft NPS. These appraisals are presented in this AoS Report (**Stage C**) which is available for consultation (**Stage D**). Following consultation on the AoS Report, BEIS will prepare an AoS Post Adoption Statement that sets out the results of the consultation and appraisal and the extent to which the views and AoS findings have been addressed in the designated NPS. Compliance with the SEA Directive requires that any resultant significant environmental effects of the NPS are monitored (**Stage E**).

Consultation and stakeholder engagement

Overview

1.26. Consultation lies at the heart of any meaningful assessment or appraisal process and is based on the key principle that plan and programme making is better where it is transparent, inclusive and uses information that has been subject to public scrutiny. In this context, the intention is that those with an interest in, or who are affected by, the draft NPS should have the opportunity to present their views on the draft NPS and the accompanying AoS.

Technical consultation on the initial AoS Scoping Report

1.27. The initial AoS Scoping Report was issued for consultation to statutory and other selected consultees between 4 August 2015 and 25 September 2015. The initial AoS Scoping Report was issued directly to the UK statutory SEA and other bodies identified in **Box 1.1** for comment. This was consistent with regulation 12 (5) of the SEA Regulations which concerns consulting statutory bodies on the appropriateness, scope and level of detail of the information that must be included in the subsequent environmental report (which in this case is the AoS Report). At over seven weeks, the AoS scoping consultation period exceeded the five week period required by regulation 12 (6) of the SEA Regulations. Whilst this technical consultation was primarily aimed at a number of statutory and selected consultees, BEIS also made the initial Scoping Report publicly available.

Box 1.1 AoS Scoping Consultees

UK SEA Statutory Consultation Bodies

- **Environment Agency**
- **Historic England**
- **Natural England**
- **Scottish Natural Heritage**
- **Historic Environment Scotland**[27]
- **Scottish Environment Protection Agency**
- **Scottish Government**
- **Natural Resources Wales**
- **Cadw (Welsh Government historic environment service)**[28]
- **Welsh Government**
- **Department of the Environment's 'Environment and Heritage Service', Northern Ireland**

Additional (Specialist) Consultees

- **Nuclear Legacy Advisory Forum (on behalf of Local Government Association)**
- **Radioactive Waste Management Limited**
- **Nuclear Decommissioning Authority**
- **The Office for Nuclear Regulation**

1.28. Comments on any aspect of the initial Scoping Report were welcomed although views were particularly sought in response to the following questions:

1. Do you agree with the main issues identified in the topic areas? Specifically –
   a) What issue or issues, which have been included in the proposed scope of the appraisal, do you think should be removed, and why?
   b) What relevant issue or issues, which have not been reflected in the proposed scope of the appraisal, do you think should be included, and why?
2. Do you think that the AoS Scoping Report sets out sufficient information to establish the context for the appraisal? If not, which areas do you think have been missed and where is information on these topics available from?
3. Do you agree that the AoS objectives and guide questions cover the breadth of issues appropriate for appraising the effects the draft NPS? If not, which objectives should be amended and which other objectives do you believe should be included?

1.29. A total of 15 responses were received from the following bodies:

- Copeland Borough Council;
- Above Derwent Parish Council;
- Northern Ireland Environment Agency;
- Environment Agency;
- Historic England;

[27] It should be noted that whilst Historic Environment Scotland is not identified as a consultation body in the SEA Regulations, Scottish Ministers have designated Historic Environment Scotland to act on their behalf on matters affecting the historic environment and it is considered appropriate to consult them in respect of this scoping exercise.
[28] Cadw is listed as a consultation body in the Environmental Assessment of Plans and Programmes (Wales) Regulations 2004 (WSI 1656 (W.170)) and it is considered appropriate to consult them in respect of this scoping exercise.

- Historic Environment Scotland;
- Department of Environment, Food and Agriculture (Isle of Man Government);
- Natural England;
- Nuclear Decommissioning Authority and Radioactive Waste Management Limited;
- Nuclear Legacy Advisory Forum - NuLEAF;
- Public Health England;
- Scottish Environment Protection Agency;
- Scottish Natural Heritage;
- EDF Energy; and
- United Utilities.

1.30. Responses related to all aspects of the initial AoS Scoping Report but particularly concerned:

- requests for further contextual information including in respect of the work carried out by the independent CoRWM;
- requests for additional baseline information and inclusion of further plans and programmes;
- amendments to the summary of key objectives identified from the review of plans and programmes and to the key issues relevant to the AoS that were summarised in the main report;
- the geographic scope of the AoS of the draft NPS;
- the topics for inclusion in the AoS of the draft NPS;
- proposed amendments to the AoS objectives, guide questions and illustrative guidance that comprise the appraisal framework; and
- the aspects of the draft NPS and related infrastructure that will be appraised.

1.31. **Appendix E** contains a schedule of the consultation responses received on the initial AoS Scoping Report, BEIS's response and the subsequent action taken and reflected in the Final Scoping Report that was published on 1 February 2016.

Habitats Regulations Assessment

1.32. In accordance with regulation 110(1) of The Conservation of Habitats and Species Regulations 2017[29] ('the Habitats Regulations'), BEIS has considered whether the draft NPS is likely to have a significant effect on any specified European sites. Such sites include Special Areas of Conservation (SACs) designated under Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora and Special Protection Areas (SPAs) designated under Council Directive 2009/147/EC on the Conservation of Wild Birds. Ramsar Sites (designated under the 1976 Ramsar Convention) are not European sites but under UK planning policy are given the same level of protection. A screening of the likely significant effects has been undertaken, and because likely significant effects on European sites have not been ruled out, an appropriate assessment of the implications for European sites has been undertaken.

1.33. The HRA is reported separately from the AoS. However, the conclusions of the HRA have helped to inform the appraisal process, particularly in respect of the potential effects of the draft NPS on biodiversity.

1.34. BEIS notes that all development consent order applications which may be made pursuant to the NPS, once designated, will be subject to the requirements of the planning system under the Planning Act 2008.

AoS Report structure

1.35. This AoS Report is structured as follows:

- **Non-Technical Summary** - Provides a summary of the AoS Report, including information on both the draft NPS and the key findings of the appraisal;
- **Section 1: Introduction** - Includes an overview of the draft NPS and AoS, the AoS Report contents and a summary of consultation on the initial Scoping Report;
- **Section 2: The Draft NPS for Geological Disposal Infrastructure** - Describes the background to the draft NPS, its objectives and regulatory context together with an overview of its structure and contents. This section also sets out the reasonable alternatives to the draft NPS that have been considered and appraised as part of the AoS;
- **Section 3: Context and Baseline** - Provides details of the review of the international, European, UK and national (England, Scotland and Wales) plans and programmes and baseline conditions for the environmental categories required by the SEA Directive and additional socio-economic topics and summarises the key sustainability issues relevant to geological disposal. Further detailed information is contained in **Appendix B**;

[29] Regulation 61(1) states: "A competent authority, before deciding to undertake, or give any consent, permission or other authorisation for, a plan or project which —
(a) is likely to have a significant effect on a European site or a European offshore marine site
(either alone or in combination with other plans or projects), and
(b) is not directly connected with or necessary to the management of that site, must make an appropriate assessment of the implications for that site in view of that site's conservation objectives".

- **Section 4: Appraisal Methodology** - Outlines the approach to the appraisal of the draft NPS and reasonable alternatives including the appraisal framework (which comprises AoS objectives and guide questions) and the technical difficulties encountered in completing the appraisal including assumptions and uncertainties;
- **Section 5: Appraisal of the Sustainability Effects of the Draft NPS and Reasonable Alternatives** - Summarises the likely significant environmental and socio-economic effects of the draft NPS and any reasonable alternatives, including cumulative effects, mitigating measures, uncertainties and risks. The detailed appraisals are contained in **Appendix B**;
- **Section 6: Conclusions and Monitoring** - Summarises the main effects of the draft NPS and reasonable alternatives to the NPS and presents views on implementation and monitoring. The reasons for selecting the draft NPS as proposed and for the rejection of alternatives are explained;
- **Glossary and Abbreviations**;
- **Appendix A: Assessment Guide Questions and Associated Guidance on Significance** – Outlines the objectives and guide questions which have been used in the appraisal and details the thresholds that have been used to determine the significance of effects in the appraisal process;
- **Appendix B: Detailed Appraisal (including Baseline and Contextual Information)** - Sets out the collated contextual and baseline information, on a topic-by-topic basis, for each of the appraisal topics along with the findings of the detailed appraisal of the draft NPS and reasonable alternatives. For each topic, this Appendix presents the following information (consistent with the SEA Directive reporting requirements):
  - **Introduction** - provides an overview of the topic;
  - **Summary of Plans and Programmes** - provides an overview of the policy context in which the NPS sits;
  - **Overview of the Baseline** - provides an overview of the baseline and the key topic specific baseline factors. This includes the key environmental characteristics of each topic or area most likely to be significantly affected;
  - **Existing Problems** - highlights some of the existing pressures on the topic area, particularly in relation to the NPS;
  - **Likely Evolution of the Baseline** - provides an overview of how the baseline is likely to change in the absence of the NPS;
  - **Assessing Significance** - outlines the objectives and guide questions related to the topic area which have been used in the appraisal of the effects of the draft NPS and reasonable alternatives alongside guidance that has helped determine the relative significance of potential effects on the objectives; and
  - **Appraisal** - includes completed matrices that record the findings of the appraisal of the draft NPS and reasonable alternatives against the AoS objectives including proposed mitigation measures (where appropriate) and measures for enhancement, assumptions and uncertainties and additional information that may be required.
- **Appendix C: Mitigation and Enhancement Measures**;

- **Appendix D: Quality Assurance Checklist**; and
- **Appendix E: Summary of Consultation Responses** - provides an overview of the responses received during consultation on the initial Scoping Report.

How information in this AoS Report meets the requirements of the SEA Directive and regulations

1.36. **Table 1.1** details how the requirements of the SEA Directive and its transposing regulations have been addressed in this AoS Report.

Table 1.1 SEA information requirements addressed within this AoS Report

SEA Information Requirements	AoS Report Reference
Schedule 2 of the SEA Regulations (SI 2004 No. 1633) sets out the following information requirements:	***The following sections of this Scoping Report address the requirements of the SEA Regulations:***
1. An outline of the contents and main objectives of the plan or programme, and of its relationship with other relevant plans and programmes.	This requirement is addressed in **Section 2** (The Draft NPS for Geological Disposal Infrastructure), **Section 3** (Context and Baseline) and **Appendix B**.
2. The relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the plan or programme.	This requirement is addressed in **Section 3** (Context and Baseline) and **Appendix B**.
3. The environmental characteristics of areas likely to be significantly affected.	This requirement is addressed in **Appendix B**.
4. Any existing environmental problems which are relevant to the plan or programme including, in particular, those relating to any areas of a particular environmental importance, such as areas designated pursuant to Council Directive 2009/147/EC (the 'new wild birds directive').	This requirement is addressed in **Section 3** (Context and Baseline) and **Appendix B**. It will be further reported on in the separate HRA Report.
5. The environmental protection objectives, established at international, Community or Member State level, which are relevant to the plan or programme and the way those objectives and any environmental considerations have been taken into account during its preparation.	This requirement is addressed in **Section 3** (Context and Baseline) and **Appendix B**.
6. The likely significant effects on the environment, including short-, medium- and long-term effects, permanent and temporary effects, positive and negative effects, and secondary, cumulative and synergistic effects, on issues such as: biodiversity; population; human health; fauna; flora; water; air; climatic factors; material assets; cultural heritage, including architectural and archaeological heritage; landscape; and the inter-relationship between the issues referred to in sub-paragraphs (a) to (l).	This requirement is addressed in **Section 5** (Appraisal of the Sustainability Effects of the Draft NPS and Reasonable Alternatives) and **Appendix B**.
7. The measures envisaged to prevent, reduce and as fully as possible offset any significant adverse effects on the environment of implementing the	This requirement is addressed in **Section 5** (Appraisal of the Sustainability Effects of the Draft NPS and Reasonable Alternatives), **Appendix B**

SEA Information Requirements	AoS Report Reference
plan or programme.	**and Appendix C**.
8. An outline of the reasons for selecting the alternatives dealt with, and a description of how the assessment was undertaken including any difficulties (such as technical deficiencies or lack of know-how) encountered in compiling the required information.	The requirement regarding the reasons for selecting the reasonable alternatives is addressed in **Section 2** (The Draft NPS for Geological Disposal Infrastructure). The requirement concerning the description of any difficulties is addressed in **Section 3** (Context and Baseline).
9. A description of the measures envisaged concerning monitoring of environmental conditions.	This requirement is addressed in **Section 6** (Conclusions and Monitoring).
10. A non-technical summary of the information provided under paragraphs 1 to 9.	A **Non-Technical Summary** is provided with this AoS Report.

2. The Draft NPS for Geological Disposal Infrastructure

Introduction

2.1. The 2014 White Paper[30] on the long-term management of higher activity radioactive waste sets out the UK Government's intention to produce an NPS to help guide applications for the development of GDFs. The 2014 White Paper identifies the following purposes of the NPS for Geological Disposal Infrastructure:

> "6.12. The purpose of the NPS is to guide the Secretary of State and the Planning Inspectorate in the consideration of any applications for a Development Consent Order for the development of a GDF, and the use of deep boreholes to characterise potential sites, in England.
>
> 6.13. Once the NPS has been designated, the Secretary of State will be required to determine any applications for development consent in accordance with it, unless certain other criteria (set out in the Planning Act 2008) apply".

2.2. This section expands on the description above, providing further detail in respect of the policy context, the need for nationally significant infrastructure projects and the scope and contents of the draft NPS for Geological Disposal Infrastructure. It also identifies the reasonable alternatives to the draft NPS that have been considered during the appraisal process.

Government policy on management of higher activity radioactive waste

2.3. In 2001, the UK Government and devolved administrations started the 'Managing Radioactive Waste Safely' programme, with the aim of finding a practical long-term management solution for the UK's higher activity radioactive waste. Between 2003 and 2006, a wide range of options for how to deal with the UK's higher activity radioactive waste was considered, from indefinite storage on or below the surface through to propelling the waste into space. This work was carried out by the independent Committee on Radioactive Waste Management (CoRWM) and involved extensive consultation with the public and expert groups.

2.4. In July 2006, CoRWM recommended[31] that geological disposal, coupled with safe and secure interim storage, was the best available approach for the long-term management of the UK's legacy of higher activity radioactive waste. CoRWM stated that the aim should be to progress disposal as soon as practicable, consistent with developing and maintaining public confidence.

[30] DECC (now BEIS) (2014) 'Implementing Geological Disposal: A framework for the long-term management of higher activity radioactive waste', available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/332890/GDF_White_Paper_FINAL.pdf

[31] CoRWM (2006) 'Managing our Radioactive Waste Safely – CoRWM's Recommendations to Government', available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/294118/700_-_CoRWM_July_2006_Recommendations_to_Government_pdf.pdf

2.5. In October 2006, the UK Government and the devolved administrations published a response broadly accepting these recommendations[32]. After public consultation, two subsequent White Papers published in 2008 confirmed the Government's commitment to geological disposal for legacy waste[33] and set out the Government's position on the use of geological disposal to dispose of higher activity radioactive waste generated as a result of new nuclear power stations[34].

2.6. In addition to accepting CoRWM's recommendations on geological disposal as the best approach for the long-term management of the UK's legacy higher activity radioactive waste, the Government also accepted:

- a commitment to an intensified programme of research and development into the long-term safety of geological disposal; and
- that developments in alternative waste management options should be actively pursued through monitoring of, and participation in, national or international research and development programmes.

2.7. In line with this, the Nuclear Decommissioning Authority (NDA) and Radioactive Waste Management Limited (RWM) continue to review other long-term management options. At the moment, no credible alternatives have emerged that would accommodate all of the categories of waste in the inventory for disposal. In any realistic future scenario, some form of GDF will remain necessary.

2.8. The UK Government remains committed to the policy of geological disposal of higher activity wastes, for the reasons set out in CoRWM's Recommendations to Government and subsequent UK Government policy documents on radioactive waste management (including the draft NPS). In June 2013, CoRWM issued a statement reiterating its commitment to geological disposal[35].

2.9. After the previous GDF siting process came to an end in 2013, the UK Government set out a new approach to siting a GDF in the 2014 White Paper[36]. The 2014 White Paper also set out the overarching policy framework for implementing geological disposal, including initial actions led by the UK Government and the developer to support the siting process. The 2014 White Paper updates and replaces the earlier 2008 White Paper, 'Managing Radioactive Waste Safely'. The siting process is separate from the process of considering development consent applications.

[32] Defra, Scottish Executive, the National Assembly for Wales and DoE (NI) (2006) 'Response to the Report and Recommendations from the Committee on Radioactive Waste Management (CoRWM)', available online at: http://130.88.20.21/uknuclear/pdfs/corwm-govresponse.pdf

[33] Defra (2008) 'Managing radioactive waste safely: a framework for implementing geological disposal', available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/68927/7386.pdf

[34] Department of Business, Energy and Regulatory Reform (DBERR) (now BEIS) (2008) Nuclear white paper 2008: 'Meeting the energy challenge', page 99, available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/228944/7296.pdf

[35] CoRWM (2013) 'CoRWM Statement on Geological Disposal', CoRWM doc. 3122 Final (13 June 2013), available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/225113/CoRWM_statement_on_geological_disposal.pdf

[36] DECC (now BEIS) (2014), 'Implementing Geological Disposal - A framework for the long-term management of higher activity radioactive waste', available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/332890/GDF_White_Paper_FINAL.pdf

The need for geological disposal infrastructure

2.10. There is a technical, ethical and legal need for the safe and secure management of the UK's higher activity radioactive waste in the long term. There is legacy waste, including waste from over 60 years' nuclear generation, which is presently temporarily stored at over 30 sites in the UK; there is also a need for disposal of higher activity radioactive waste from new nuclear power stations that will be commissioned in the coming decades.

2.11. The CoRWM recommendations identified geological disposal, coupled with safe and secure interim storage, as the best available approach for the long-term management of the UK's legacy of higher activity radioactive waste. This was accepted in the Government's response to these recommendations. There is also a need to prevent a burden from falling on future generations and reduce the future potential risks associated with repackaging waste in temporary storage and terrorism or the impacts of climate change.

2.12. The UK Government's policy framework for managing higher activity radioactive waste in the long term specifically through geological disposal has been developed, consulted on and put into effect, prior to the development of the draft NPS.

2.13. The Secretary of State will assess applications for infrastructure covered by the NPS on the basis that need has been demonstrated.

Nationally significant infrastructure projects

Legislative and consenting background

2.14. The Planning Act 2008 introduced a procedure to streamline the decision-making process for nationally significant infrastructure projects. Under the Act, a developer wishing to construct a nationally significant infrastructure project must first apply for development consent. All development consent order applications which may be made pursuant to the NPS, once designated, will be subject to the requirements of the planning system under the Planning Act 2008. As part of this process, the developer should consider whether the proposed nationally significant infrastructure project should be considered as Environmental Impact Assessment development under the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 (the Environmental Impact Assessment Regulations)[37]. Similarly, the applicant should consider the potential effects of the proposed development on protected habitats through consideration of requirements of the Conservation of Habitats and Species Regulations 2017[38].

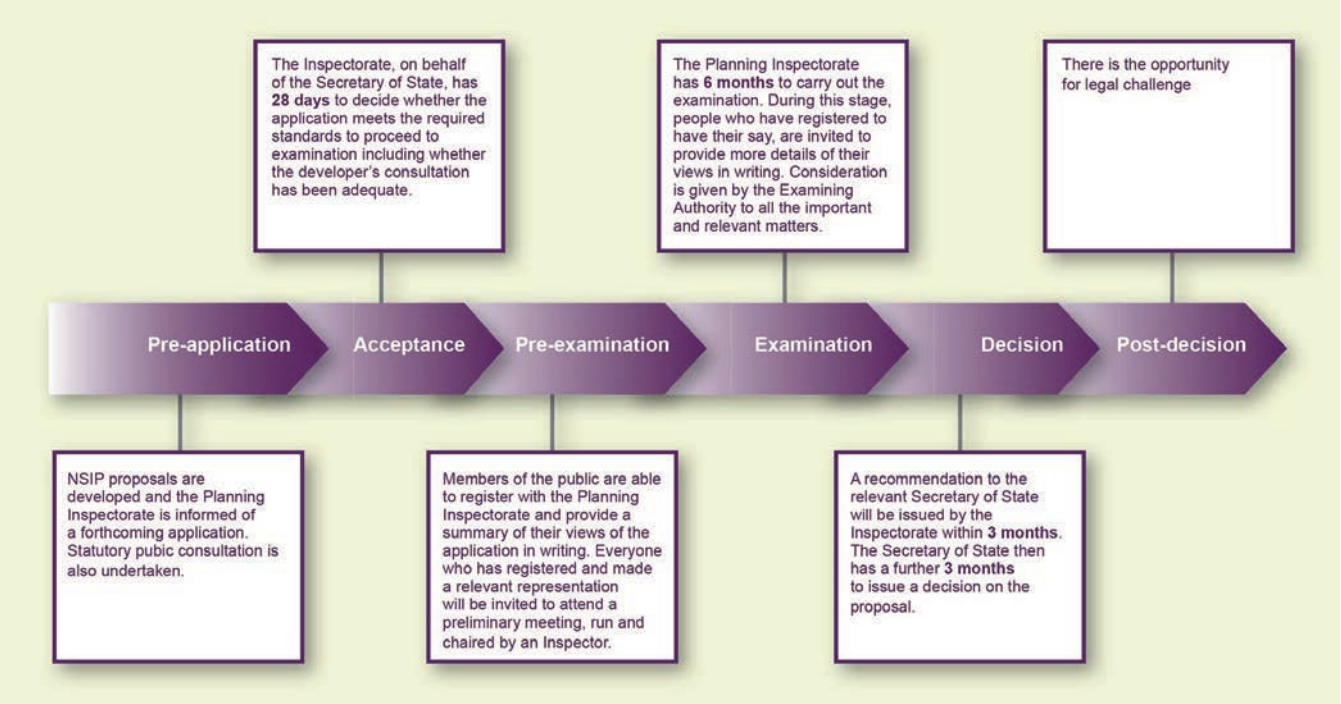
2.15. For such projects, the relevant Secretary of State will appoint an 'Examining Authority' to examine the application. The Examining Authority will be from the Planning Inspectorate, and will be either a single Inspector or a panel of three or more Inspectors. Once the examination has been concluded, the Examining Authority will make a

[37] Planning Inspectorate (March 2015), Preliminary Environmental Information, Screening and Scoping: Advice note Seven: Environmental Impact Assessment: Preliminary Environmental Information, Screening and Scoping.
[38] Planning Inspectorate (December 2015), Habitats Regulations Assessment: Advice note ten: Habitats Regulations Assessment relevant to nationally significant infrastructure projects.

recommendation to the Secretary of State, who will make the decision on whether to grant or to refuse consent.

2.16. There are six key stages in the development consent application process for nationally significant infrastructure projects and these are shown in **Figure 2.1**.

Figure 2.1 The development consent process for nationally significant infrastructure projects



2.17. Part 3 of the Planning Act 2008 lists the projects that are to be determined as nationally significant infrastructure projects. In March 2015, the Infrastructure Planning (Radioactive Waste Geological Disposal Facilities) Order 2015[39] amended the Act to extend the categories of nationally significant infrastructure projects to include GDFs and the deep boreholes required to investigate potential sites for these facilities.

2.18. In addition to development consent under the Planning Act 2008, a developer will also need permits from the environmental regulator before constructing a nationally significant infrastructure project. In England, the Environment Agency is responsible for environmental protection under the Environmental Permitting (England and Wales) Regulations 2016. Its responsibilities include regulating radioactive and non-radioactive discharges and disposals to air, water (both surface and groundwater) and land, including disposal by transfer to another site. There are separate environmental regulators in other parts of the UK. The Environment Agency will therefore be responsible for regulating the environmental aspects of developing geological disposal infrastructure (e.g. regulating the impacts of any discharges from the facility's ventilation system during the operation of the facility).

2.19. For a GDF, the developer will need regulatory approval before each stage of development can begin (a process known as 'staged regulation') and, in particular,

[39] The Infrastructure Planning (Radioactive Waste Geological Disposal Facilities) Order 2015, S.I. 2015 No. 949, available online at: http://www.legislation.gov.uk/uksi/2015/949/pdfs/uksi_20150949_en.pdf

disposal of radioactive waste will not be allowed without the appropriate environmental permit.

2.20. The independent Office for Nuclear Regulation is responsible for the safety and security regulation of the nuclear sector across the UK. The Office for Nuclear Regulation grants licences that allow licence holders to use nuclear sites for specified activities. The Office for Nuclear Regulation also regulates the safety of transport of radioactive materials. The Office for Nuclear Regulation works closely with the International Atomic Energy Agency (IAEA) and European Commission to ensure that the UK's safeguarding obligations are met.

2.21. A future GDF will be a nuclear installation under the Nuclear Installations Act 1965 and, as such, it will be the Office for Nuclear Regulation's role to ensure that, prior to construction of a GDF, a licensing process is in place such that the Office for Nuclear Regulation can consider the granting of a licence for the site, with the requisite site licence conditions attached, and enforce the requirements of that licence. The Office for Nuclear Regulation will also be responsible for advice, assessment of the licensee's security, and approving security arrangements for the geological disposal facility, and for securing compliance with those arrangements.

2.22. To demonstrate how a GDF meets high standards of safety, security and environmental protection, the developer will need to develop and maintain a number of safety cases (including operational safety and environmental safety) and security plans throughout the lifecycle of the facility, all of which will be subject to scrutiny by the independent nuclear regulators. Where the developer and/or independent regulators are not satisfied that suitable safety cases for the construction, operation and closure of a GDF can be made following receipt of data from any programme of deep boreholes, work at that site will cease.

2.23. The Office for Nuclear Regulation and the appropriate environmental regulator must be consulted in any application for development consent for a GDF. The appropriate environmental regulator must also be consulted in any application for development consent for deep borehole investigations to characterise potential candidate sites.

National Policy Statements (NPSs)

2.24. NPSs set out the criteria by which applications for nationally significant infrastructure projects within their scope are determined. They include the Government's objectives for the development of nationally significant infrastructure in a particular sector and set out:

- how this will contribute to sustainable development;
- how these objectives have been integrated with other Government policies;
- how actual and projected capacity and demand have been taken into account;
- relevant issues in relation to safety or technology;
- circumstances where it would be particularly important to address the adverse impacts of development; and
- specific locations, where appropriate, in order to provide a clear framework for investment and planning decisions.

2.25. They also include any other policies or circumstances that Ministers consider should be taken into account in decisions on infrastructure development.

2.26. NPSs undergo a process of public consultation and parliamentary scrutiny before being designated (i.e. published). They provide the framework within which Inspectors make their recommendations to the Secretary of State.

The NPS for geological disposal infrastructure

What is the purpose of the NPS?

2.27. The NPS for Geological Disposal Infrastructure will set out the need for geological disposal infrastructure for the disposal of higher activity radioactive waste, and the Government's policies to deliver them. Once designated, it will be used as the primary basis for the examination by the Examining Authority of, and decisions by the Secretary of State on, development consent order applications for geological disposal facility infrastructure that falls within the definition of a nationally significant infrastructure project as defined in the Planning Act 2008. It addresses the following objectives:

- implementation of government policy on geological disposal for higher activity radioactive waste and the need for such infrastructure;
- to establish a clear and transparent planning process to guide the preparation and development of nationally significant infrastructure projects relating to the geological disposal of higher activity radioactive waste in England;
- to provide a planning process that enables infrastructure to be developed which will provide a long-term, secure, safe and sustainable solution to the disposal of higher activity waste;
- to provide guidance to nationally significant infrastructure project developers on the relevant infrastructure, generic impacts and general siting considerations that may be needed to be taken into account when planning for the development of geological disposal infrastructure;
- to provide the primary basis for examination by the Examining Authority and for decisions by the Secretary of State, on development consent applications for geological disposal infrastructure; and
- to provide policy and guidance on generic impacts to support any relevant local planning authorities in preparing their local impact reports, which they will be invited to prepare under Section 60 of the Planning Act 2008.

What is the scope of the NPS?

2.28. The NPS, once designated, will provide the framework for decision making on development consent applications for the construction of nationally significant infrastructure related to the geological disposal of higher activity radioactive waste only in England, and beneath the seabed in waters adjacent to England up to the seaward limits of the territorial sea.

2.29. The NPS will be non-site specific and so does not include candidate sites. It is therefore analogous to the non-nuclear Energy NPSs (EN-1 to EN-5) rather than the approach taken in the Energy NPS for new nuclear infrastructure (EN-6). The process of identifying a site for geological disposal infrastructure is separate from the process of

considering development consent applications. Any application for development consent is expected to be made following a separate GDF siting process used to identify prospective GDF sites. In line with current Government policy as outlined in the 2014 White Paper, the siting process is expected to be led by the developer.

2.30. In Scotland, Wales and Northern Ireland, planning consents for all radioactive waste projects are devolved to the Scottish Government, Welsh Government and Northern Ireland Executive respectively. The Secretary of State will not decide applications in these regions and the NPS will not apply. Notwithstanding, relevant Scottish and Welsh plans and programmes and baseline information have been considered in the preparation of this AoS, given the early assumption that a GDF and related deep boreholes sited in England could potentially have effects in Scotland or Wales due to their shared borders, and geographical proximity, with England.

What infrastructure is covered by the NPS?

2.31. The infrastructure covered by the NPS reflects the definitions for nationally significant infrastructure that are related to the geological disposal of higher activity radioactive waste set out in Section of 30A of the Planning Act 2008, as follows:

- Construction of facilities in England where the main purpose of the facility is expected to be the final disposition of radioactive waste, where:
  - the part of the facility where radioactive waste is to be disposed of is expected to be constructed at a depth of at least 200 metres beneath the surface of the ground or seabed; and
  - the natural environment which surrounds the facility is expected to act, in combination with any engineered measures, to inhibit the transit of radionuclides from the part of the facility where radioactive waste is to be disposed of to the surface.
- Construction of one or more deep boreholes, and any associated excavation, construction or building work, in England or waters adjacent to England up to the seaward limits of the territorial sea, where:
  - the deep borehole is expected to be constructed to a depth of at least 150 metres beneath the surface of the ground or seabed; and
  - the main purpose of constructing the deep borehole is to obtain information, data or samples to determine the suitability of a site for the construction or use of a radioactive waste GDF.

2.32. Therefore, the NPS covers both types of infrastructure projects – the deep boreholes necessary to determine the suitability of sites for a GDF, and the construction of a GDF itself. Applications for development consent for these projects may also include 'associated development' within the meaning of the Planning Act 2008. Development that does not fall within the definition of geological disposal infrastructure or associated development may require a separate application for planning permission to a local authority.

What is the waste to be managed by a GDF?

2.33. The types of higher activity radioactive waste (and nuclear materials that could be declared as waste) to be received and disposed of in a GDF covered by the NPS are identified in the 2014 White Paper[40] as:

- High level waste (HLW) arising from the reprocessing of spent nuclear fuel at Sellafield;
- Intermediate level waste (ILW) arising from existing nuclear licensed sites, and defence, medical, industrial, research and educational activities;
- the small proportion of low level waste (LLW) that is not suitable for disposal in the national Low Level Waste Repository;
- spent fuel from existing commercial reactors (yet to be declared waste) and research reactors that is not reprocessed;
- spent fuel (yet to be declared waste) and intermediate level waste from a new build programme up to a defined amount;
- plutonium stocks - residual plutonium not re-used in new fuel manufacture (yet to be declared waste);
- uranium stocks – including that arising from enrichment and fuel fabrication activities (yet to be declared waste); and
- irradiated fuel and nuclear materials (yet to be declared waste) from the UK defence programme.

2.34. The volumes of these wastes (known as the 'inventory for disposal') have been made publicly available as part of the Radioactive Waste Management Limited (RWM) Geological Disposal: The 2013 Derived Inventory[41]. When an application is made for development consent for a GDF, there will remain some uncertainty with regard to the volumes of these wastes (e.g. the precise volume of waste from new nuclear power stations will not be known).

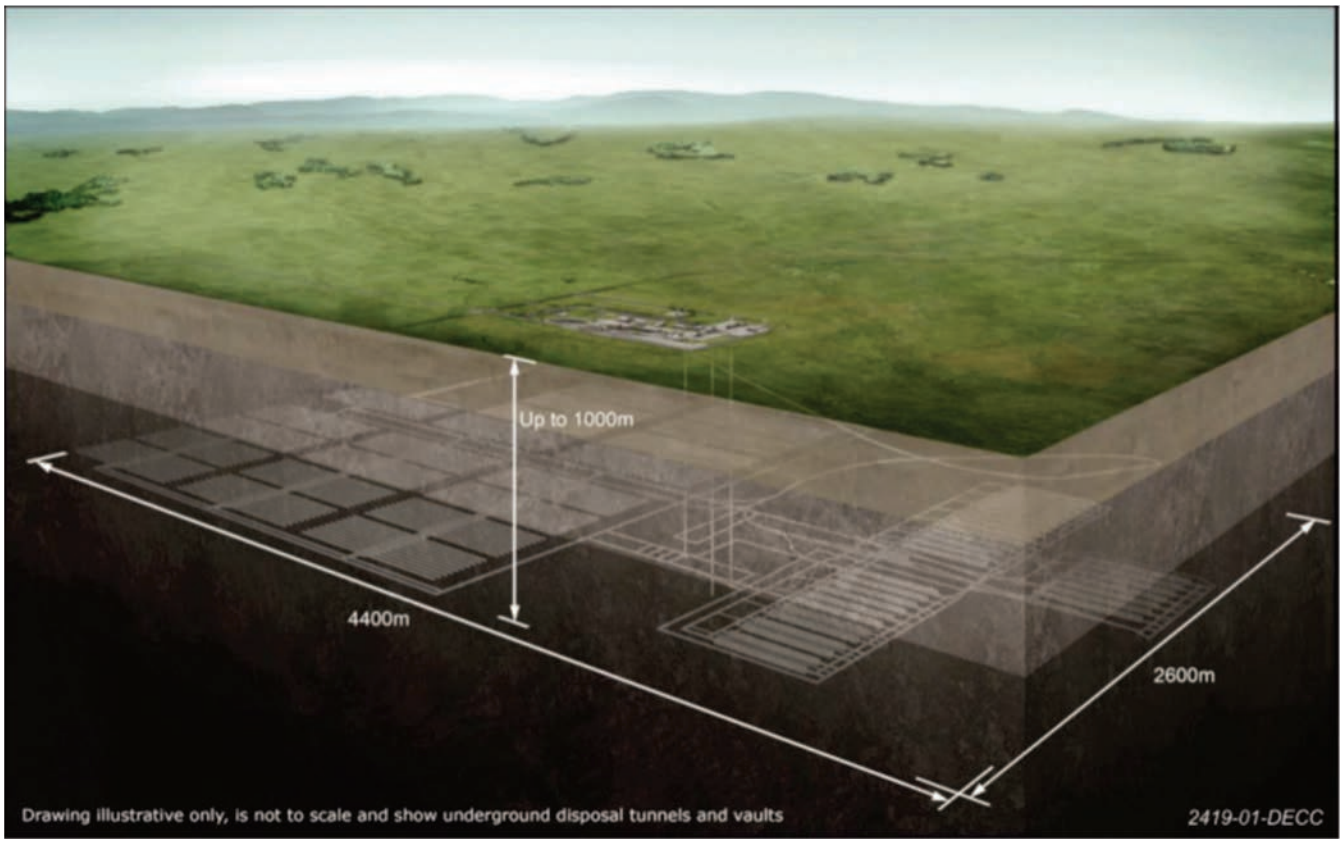
What could a GDF look like?

2.35. **Figure 2.2** provides an illustrative diagram for a GDF. It will have both surface and underground facilities linked by access tunnels and/or shafts, depending on the layout of these facilities. The underground facilities do not need to be located directly below the surface facilities – they could be separated by a distance of several kilometres.

[40] DECC (now BEIS) (2014) 'Implementing Geological Disposal: A framework for the long-term management of higher activity radioactive waste', paragraph 2.17, available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/332890/GDF_White_Paper_FINAL.pdf

[41] Radioactive Waste Management 'The 2013 Derived Inventory', available online at: https://rwm.nda.gov.uk/publication/geological-disposal-2013-derived-inventory/

Figure 2.2 Illustrative diagram of a geological disposal facility



2.36. The surface facilities could cover an area of approximately one square kilometre, although the layout of these facilities will be tailored to the site. The primary purpose of the surface facilities will be to receive waste packages from a port or the rail and road networks, and transfer them to the underground disposal facilities.

2.37. The underground facilities are expected to comprise a system of vaults for the disposal of intermediate level waste, and an array of engineered tunnels for the disposal of high level waste and spent fuel. High level waste and spent fuel require different disposal structures because they generate heat.

2.38. The precise layout and design of the facilities will depend on the inventory for disposal and the specific geological characteristics at the site in question.

2.39. Site investigations, including the drilling of deep boreholes, will be undertaken to improve understanding of the local geology and to identify potential sites prior to the construction of a GDF. This is known as the site characterisation phase. No radioactive waste will be emplaced for disposal during this phase.

2.40. **Figure 2.3** provides an overview of the geological disposal process from its preparation to its closure. It highlights an initial community engagement and site investigations phase of 15 to 20 years. The construction of the surface facilities and underground tunnels and vaults could then last for a further 20 years. It is envisaged that the facility would operate for approximately 100 to 150 years, although further construction of underground vaults to receive further intermediate level waste, high level waste and spent fuel would occur during this operational period. Closure of the facility would take place after this, with vaults backfilled and sealed and surface facilities removed, and the site restored and returned to a consented land use.

Figure 2.3 The geological disposal process

The draft NPS for Geological Disposal Infrastructure

2.41. The draft NPS, which is the subject of this AoS Report, comprises five chapters, as follows:

- **Chapter 1**: provides an overview of the purpose and scope of the NPS including the draft NPS objectives.
- **Chapter 2**: sets out the government policy on the management of higher activity radioactive waste, including an outline of what geological disposal is, the waste to be managed and the strategy for implementation.
- **Chapter 3**: outlines the need for geological disposal infrastructure.
- **Chapter 4**: sets out the assessment principles against which applications relating to geological disposal infrastructure are to be decided. In considering any proposed development, the Examining Authority and the Secretary of State (as decision maker) should take into account:
  - its potential benefits, including its contribution to meeting the need for geological disposal infrastructure, job creation and any long-term or wider benefits; and
  - its potential adverse impacts, including any longer-term and cumulative adverse impacts, as well as any measures to avoid, reduce or compensate for any adverse impacts.

The chapter refers to regulatory requirements associated with planning such as the Infrastructure Planning Environmental Impact Assessment Regulations[42] and the Habitats Regulations[43]. It also outlines the permitting and consenting requirements of (amongst others), the Environmental Permitting (England and Wales) Regulations 2016 (EPR2016), the Nuclear Installations Act 1965 (NIA65) and the Planning Act 2008.

- **Chapter 5**: sets out the generic impacts to be considered by an applicant and the Examining Authority. Guidance is provided across the following topics:
  - Air Quality;
  - Noise;
  - Biodiversity and Nature Conservation (including Flora and Fauna);
  - Climatic Factors including Climate Change and Adaptation;
  - Cultural Heritage including Architectural and Archaeological Heritage;
  - Socio-economics, Population and Demographics;
  - Flood Risk and Coastal Change;
  - Human Health;
  - Landscape and Visual Impacts;
  - Land Use;
  - Traffic and Transport;
  - Waste Management; and
  - Water Quality (including Surface and Ground Water Quality and Availability).

  For each impact, guidance is provided to the applicant on the matters to be considered and presented in an Environmental Statement, completed to meet the requirements of the Environmental Impact Assessment Regulations, and on decision making by the Secretary of State. Guidance is also provided on the proposed mitigation measures to be considered by the applicant.

Reasonable alternatives to the draft NPS

Overview

2.42. Article 5(1) of the SEA Directive requires the identification, description and evaluation of "the likely significant effects on the environment of implementing the plan or programme, and reasonable alternatives taking into account the objectives and the geographical scope of the plan or programme".

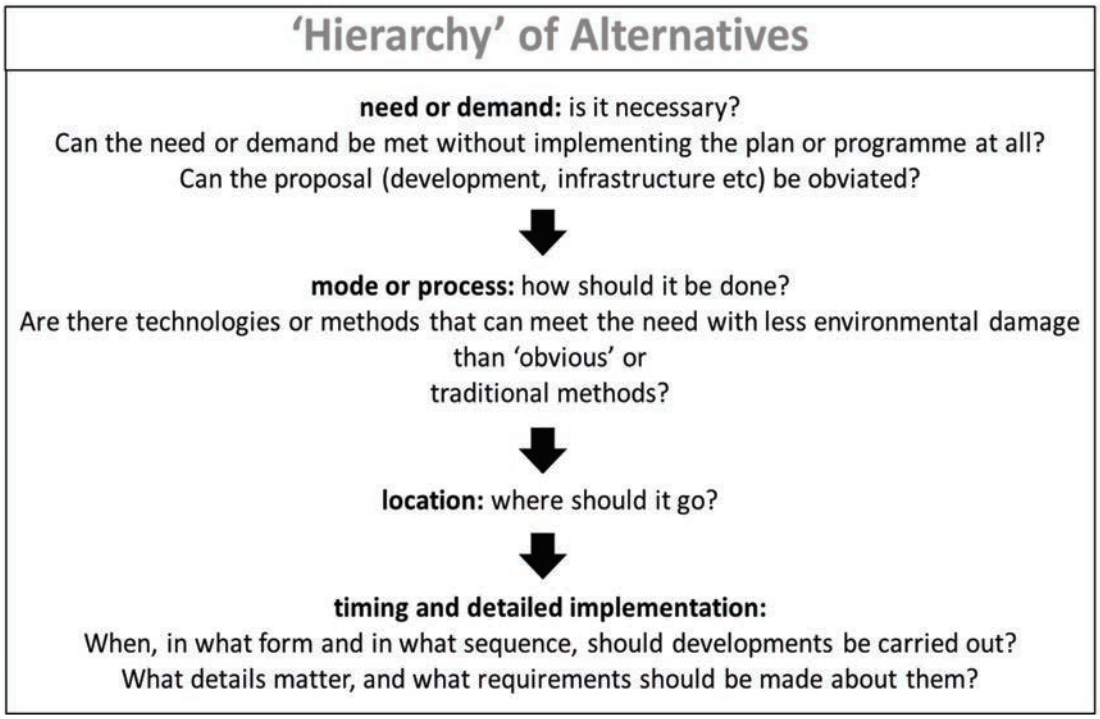
2.43. The Department for Communities and Local Government's guidance on the issue of alternatives within an emerging NPS is that:

[42] The Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 (SI 2009/2263).
[43] The Conservation of Habitats and Species Regulations 2017 and the Offshore Marine Conservation (Natural Habitats &c) Regulations 2007 (as amended).

"The accompanying Appraisal of Sustainability should support this by considering the implications of the alternatives to building new infrastructure. If some of the possible alternatives go against established Government policy, then consider the scope for considering policy alternatives within the AoS without reopening settled policy"[44].

For example, the Overarching Energy NPS, EN-1, considered giving more emphasis to environmental protection, or to decarbonisation of energy supply, or to affordable energy within the overall policy objective.

2.44. The Office of the Deputy Prime Minister's SEA guidance includes a 'hierarchy' of alternatives[45]:



2.45. Consideration of the reasonable alternatives for the NPS should take into account the approach set out in relevant guidance and be consistent with it unless there are good reasons to depart from it.

2.46. **With regards to the first question 'is it necessary?'** (whether a permanent solution to the management of UK higher activity waste is necessary), there is legacy waste, including waste from over 60 years' nuclear generation, that is presently temporarily stored at over 30 sites in the UK. There is also a need for disposal of higher activity radioactive waste for new nuclear power stations that will be commissioned in the coming decades. Interim storage provides a temporary, safe and secure environment for higher activity radioactive waste. It is not, however, a permanent solution.

[44] Department for Communities and Local Government (2013) 'How to prepare a National Policy Statement – A High Level Advice Note for Departments' Aug 2013.
[45] Office of the Deputy Prime Minister (ODPM) (now the Department for Communities and Local Government (DCLG)) (2005) 'A Practical Guide to the Strategic Environmental Assessment Directive', available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/7657/practicalguidesea.pdf
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/7657/practicalguidesea.pdf

2.47. Higher activity waste needs to be isolated from people and the surface environment for very long periods of time. Continuing with surface storage over such periods would require human monitoring, maintenance, rebuild and repackaging and constant protection from natural processes, environmental changes and malicious attack. The Government does not, therefore, consider this to be a permanent solution.

2.48. There is also a need to avoid imposing the burden on future generations that ongoing, indefinite storage of higher activity radioactive waste would represent, both in a financial sense and in terms of the increased safety risk created by the ongoing need to rebuild waste stores and repackage waste over many thousands of years. In this regard, the Organisation for Economic Co-operation and Development (OECD) Nuclear Energy Agency Radioactive Waste Management Committee has concluded that "from an ethical standpoint, including long-term safety considerations, our responsibilities to future generations are better discharged by a strategy of final disposal than by reliance on stores which require surveillance, bequeath long-term responsibilities of care, and may in due course be neglected by future societies whose structural stability should not be presumed"[46]. It is therefore the UK Government's view that there is a technical and ethical need to manage this higher activity radioactive waste.

2.49. **With regard to the question of how it should be done**, CoRWM examined a wide range of options for the long-term management of the UK's higher activity radioactive waste including alternative methods of disposal, in a process which involved extensive consultation with the public and expert groups. CoRWM issued recommendations in July 2006 that geological disposal, coupled with safe and secure interim storage, was the best available approach for the long-term management of the UK's legacy of higher activity radioactive waste[47]. In October 2006, the UK Government and the devolved administrations published a response broadly accepting these recommendations[48]. After public consultation, two subsequent White Papers published in 2008 confirmed the Government's commitment to geological disposal for legacy waste[49] and set out the Government's position on the use of geological disposal to dispose of higher activity waste generated as a result of new nuclear power stations[50]. In June 2013, CoRWM issued a statement reiterating its commitment to geological disposal[51], stating that "The aim should be to progress to disposal as soon as practicable, consistent with developing and maintaining public and stakeholder confidence". Since then, the UK Government has been committed to the policy of geological disposal, most recently reflected in the 2014 White Paper.

[46] Nuclear Energy Agency (NEA), Organisation for Economic Co-operation and Development (2008) 'Moving Forward with Geological Disposal – A Collective Statement by the NEA Radioactive Waste Management Committee', 2008 Directive 2011/70/Euratom, recital 23, July 2011.
[47] CoRWM (2006) 'Managing our Radioactive Waste Safely – CoRWM's Recommendations to Government', available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/294118/700_-_CoRWM_July_2006_Recommendations_to_Government_pdf.pdf
[48] Defra, Scottish Executive, the National Assembly for Wales and DoE (NI) (2008) 'Response to the Report and Recommendations from the Committee on Radioactive Waste Management (CoRWM)', available online at: http://130.88.20.21/uknuclear/pdfs/corwm-govresponse.pdf
[49] Defra (2008) 'Managing radioactive waste safely: a framework for implementing geological disposal', available on line at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/68927/7386.pdf
[50] DBERR (now BEIS) (2008) Nuclear white paper 2008: 'Meeting the energy challenge', page 99, available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/228944/7296.pdf
[51] CoRWM (2013) 'CoRWM Statement on Geological Disposal', CoRWM doc. 3122 Final (13 June 2013), available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/225113/CoRWM_statement_on_geological_disposal.pdf

2.50. The primary objective of the NPS is the: "implementation of government policy on geological disposal for higher activity radioactive waste and to set out the need for such infrastructure" (paragraph 1.10.1). Any alternative policy on the long-term management of radioactive waste that does not involve geological disposal (i.e. a 'no GDF policy') cannot therefore fulfil the primary objective of the NPS. In addition, a 'no GDF policy' could not satisfy the need for a permanent disposal solution for higher activity radioactive waste from a technical, ethical or legal perspective. Council Directive 2011/70/Euratom broadly accepts that at the technical level, at this time, deep geological disposal represents the safest and most sustainable option as the end point of the management of high-level waste and spent fuel considered as waste[52]. The IAEA safety standards also require that governments "establish and maintain an appropriate governmental, legal and regulatory framework for safety within which responsibilities shall be clearly allocated for disposal facilities for radioactive waste to be sited, designed, constructed, operated and closed"[53].

2.51. For these reasons, an alternative to a policy on geological disposal, i.e. a 'no GDF policy' is not a reasonable alternative and will not be considered further.

2.52. **The focus of the alternatives rests on the third question within the hierarchy, i.e. 'where should it go?**', and specifically the alternatives to delivering geological disposal through a non-site specific NPS, which could include:

- no NPS;
- an NPS that is generic but applies criteria (for example, criteria based on excluding areas of specific environmental concern); and
- a location-specific NPS that identifies candidate sites for the GDF.

2.53. **With regard to the fourth question, the timing and detailed form of implementation**, as these are issues that would be addressed by a developer and an application for development consent, they are considered outside the scope of a national, long-term assessment.

Alternatives for the GDF NPS

2.54. The alternatives to a non-site specific NPS identified in the previous section are considered in more detail below along with the rationale on whether to take them forward for appraisal.

(A) No NPS

2.55. The 2014 White Paper set out the Government's intention to designate a NPS for GDF infrastructure. It is intended that the NPS sets out the clear policy framework in which planning decisions are to take place, making these decisions as transparent as possible.

2.56. Although it is the view of Government that a NPS would facilitate the successful and timely delivery of a GDF, it is still considered useful (in order to provide a comparator) to assess the socio-economic and environmental effects of a change of policy that

[52] Directive 2011/70/Euratom, recital 23, July 2011.
[53] IAEA (2011) 'IAEA Safety Standards - Disposal of Radioactive: Specific Safety Requirements No.SSR-5 (Waste Requirement 1: Government responsibilities)'.

involved proceeding with no NPS, whilst still giving effect to the policy on disposal of higher activity radioactive waste. It should be noted however, that the no NPS reasonable alternative is separate and distinct from the baseline analysis presented in **Appendix B** and summarised in **Section 3** and which represents the current state of the environment and its likely evolution under a 'business as usual' scenario (i.e. without a GDF). Under this reasonable alternative, proposals for geological disposal infrastructure could still be considered in the context of Council Directive 2011/70/Euratom, which broadly accepts that deep geological disposal represents the safest and most sustainable option as the end point of the management of high level waste and planning decisions would be made in the context of the prevailing national planning policy and legislation.

2.57. Whilst it is marginal as to whether such an alternative is in fact a reasonable alternative to the proposed approach (given the 2014 White Paper commitment), it is considered appropriate to give the option further consideration and it has therefore been taken forward into the assessment phase of the AoS.

2.58. There is also in theory the potential to designate a NPS that does not facilitate the successful and timely delivery of geological disposal infrastructure. Whilst providing a theoretical base for an alternative, it would be inconsistent with the objectives of the draft NPS, in particular the first objective, and so has not been taken forward as a reasonable alternative in this AoS.

(B) Criteria-based NPS

Consideration of principle of whether use of criteria is reasonable

2.59. A criteria-based NPS would exclude development in, or restrict development to, areas meeting certain criteria (be they 'exclusionary' or 'inclusionary' criteria). In principle, a non-site specific NPS containing criteria to further control the areas in which geological disposal infrastructure could potentially be developed is capable of being a reasonable alternative to a non-site specific NPS without such criteria.

2.60. There is an extremely broad range of inclusionary and exclusionary criteria that could be applied in relation to such an approach. Within the options of possible inclusionary and exclusionary criteria that could be included in the NPS, some may have a positive impact on the overall sustainability of development, others may not.

2.61. Applying exclusionary criteria will not prescribe how the (separate) siting process for locating a GDF should take place, but will explain to developers what locations might be capable of meeting development consent criteria, if those were to emerge as options from the separate siting process. By using exclusionary criteria, the Government would, in effect, be making a positive policy decision that development consent would not be granted in certain areas because it would conflict with other priorities.

2.62. The converse of this would be to apply 'inclusionary criteria' to the NPS, whereby certain criteria are prescribed in the NPS which a location must satisfy for it to be considered suitable for development of a GDF. Whilst it may be possible to apply any number of inclusionary criteria, these criteria will not offer such a robust basis to avoid adverse effects as exclusionary criteria specifically designed to protect sensitive areas. For this reason, it is most appropriate to focus the assessment of reasonable alternatives on a NPS that applies exclusionary criteria and which would exclude development occurring in specified areas and/or sites.

2.63. Whilst this is not the current preferred approach, the outcome of the AoS may show that by applying certain exclusionary criteria the environmental benefits significantly outweigh the negative impacts to such an extent that the risk to programme delivery would be tolerable.

2.64. With this approach in mind, the following sub-section discusses how exclusionary criteria may be defined in a reasonable alternative to the current preferred option of a non-site specific NPS without exclusionary criteria.

Exclusionary criteria

Definition of exclusionary criteria

2.65. For the purposes of considering alternatives for the draft NPS, exclusionary criteria are those criteria which, when applied, would ensure that any geological disposal infrastructure development could not take place within an area or site possessing certain prescribed characteristics. Such criteria would be for the purpose of protecting the environment and may include, for example, excluding development at, under or adjacent to World Heritage Sites, listed buildings, National Parks, or Areas of Outstanding Natural Beauty. In consequence, they are a measure that seeks to avoid adverse effects from future geological disposal infrastructure development at locations possessing certain characteristics.

Consideration of which exclusionary criteria are reasonable

2.66. It is not considered reasonable to exclude areas or sites based on those criteria related to safety that will be assessed and regulated by independent regulators. These will be assessed in detail by the developer and the independent regulators in safety cases at a later stage, to seek regulatory approvals separately from the development consent process. These will be based on extensive data gathering at any site under consideration, over many years. By excluding areas at an early stage on the basis of safety without access to the relevant information from detailed site investigations, Government would be prejudging the suitability of some sites before all the facts were available. Some examples of characteristics related to safety that will be assessed by independent regulators at a later stage, and therefore would not be appropriate to exclude at the development consent application stage, are:

- the host rock type;
- the groundwater regime (including the presence of aquifers and protected groundwater zones at certain depths); and
- the presence of natural resources.

2.67. These criteria are intrinsic to the safety and security of the disposal parts of the infrastructure at any site and will be looked at in detail by the developer, to form part of the safety cases which will be considered by the independent safety, security and environmental regulators. Furthermore, by using engineering and management solutions, a developer could build a satisfactory safety case for the final disposal of waste in a number of different scenarios, all of which cannot be defined at the generic stage. **As a result, excluding areas on the basis of criteria related to safety, before a developer has submitted a safety case is not a reasonable alternative to be taken forward for consideration in the assessment.**

2.68. It is considered that the following sets of criteria are the most appropriate to provide a robust assessment of the draft NPS, particularly as there are already clear sets of well-defined sensitive areas that can be considered:

- Landscape, cultural and natural heritage:

  (i) a National Park;

  (ii) an Area of Outstanding Natural Beauty (AONBs);

  (iii) a World Heritage Site; or

  (iv) the Broads.

- Nature conservation (e.g. SACs, SPAs, Ramsar sites[54]).

2.69. Each category is discussed below in regard to its reasonableness.

Landscape, cultural and natural heritage (e.g. National Parks, AONBs and World Heritage Sites)

2.70. There are 10 National Parks (including the Broads) and 33 AONBs in England (and one AONB, the Wye Valley, which straddles the border between England and Wales), covering around 9% and 10% of the land area respectively. Whilst these are designated by Government for the protection and enhancement of their natural beauty, they normally include a number of communities within their boundaries. National Parks and AONBs are by nature in rural areas where there can be limited employment opportunities and outward migration of people of working age.

2.71. There could be significant economic reasons for using the land beneath National Parks. There have been instances where excavation/mining works have been located beneath National Parks in England previously with appropriate controls to prevent any significant effects. Exclusion of these areas could also reduce the scope of community engagement.

2.72. The use of certain exclusionary criteria could have socio-economic impacts on an area, for example in relation to tourism and recreation. These impacts may be positive or negative. The local and/or national economy could be similarly affected by development (or at least be perceived to be affected).

2.73. Similarly, exclusionary criteria could extend to World Heritage Sites. These are heritage assets of the highest significance. Whilst reflecting that it is important that the programme would not lead to substantial harm to, or loss of, a World Heritage Site, there could also be circumstances where underground workings could be situated within a World Heritage Site (for example, onshore oil extraction has been occurring on the Dorset Coast World Heritage Site since 1960). Similarly some of the World Heritage Sites in the UK relate to industrial and mining heritage and a case could be put forward by a developer that a development in such an area was consistent with previous land use and local culture.

2.74. As seen in the above examples, defining these exclusionary criteria based on landscape, cultural and natural heritage values could have both positive and/or negative

[54] Special Areas of Conservation (SACs), Special Protection Areas (SPAs), and Ramsar sites are sites afforded special protection by UK Government. More information can be found on the specifics of these areas online at: http://jncc.defra.gov.uk/page-1527

impacts. For this reason, **this option is considered a reasonable alternative and has been taken forward into the assessment.**

Nature conservation (e.g. SACs, SPAs, Ramsar sites)

2.75. Although the area of England covered by environmental protection areas (such as SACs, SPAs, and Ramsar Sites) including marine areas is significant (~7%),, it may be a reasonable alternative (to a non-site specific NPS without criteria) to exclude development from taking place at, above or below the designated conservation areas in order to lessen the likelihood of any adverse effects occurring.

2.76. However, simply excluding works from within a designated conservation area would not necessarily exclude the possibility of adverse effects occurring (although the general risk of adverse effects is assumed to be reduced). Adverse effects could arise if the development were sited adjacent or close to the boundary of the designated conservation area, or if the reasons for the designation included mobile species (such as bats or migratory birds) which used extended areas for foraging or breeding. Further reference would need to be given to any effects on conservation objectives or interest features of the designated conservation area (for example, “no development will be permitted within 20 kilometres of an SAC designated for its bat populations”) for an exclusionary approach to be able to avoid adverse effects (as opposed to lessening their likelihood).

2.77. At this strategic assessment stage, it is important to note that the specific impacts of geological disposal infrastructure development at a specific site are not yet known and would only be considered in detail in any site-specific Environmental Impact Assessment accompanying the Development Consent Order (DCO) application. In the absence of detailed assessment, a generic consideration of the impacts on nature conservation areas could provide a valuable baseline of the potential impacts that geological disposal infrastructure could have on a nature conservation area; in particular, it could assist with the required assessment of the NPS of likely significant effects on nature conservation areas under the Habitats Directive. This would be useful information for the Examining Authority during assessment and the Secretary of State when making decisions on whether the benefits of developing geological disposal infrastructure significantly outweigh the impacts.

2.78. As the extent of the impacts of geological disposal infrastructure on nature conservation sites, particularly with regard to any negative effects, is currently unknown, an assessment of these impacts (and their reduction or avoidance) would provide valuable baseline information when considering the benefits of any approach. **In consequence, it is concluded that excluding development within protected nature conservation sites (such as SACs, SPAs and Ramsar Sites) is a reasonable alternative to be taken forward for consideration in the assessment.**

(C) Site-specific NPS

2.79. The draft NPS will apply to development consent applications for geological disposal infrastructure in England, or territorial waters adjacent to England. At present, it is intended that it will not identify or prioritise any specific sites, on the basis of relative planning impacts or any other metric. The Government has no priority sites in mind, and does not intend to prepare a list of suitable sites. The information necessary to identify such sites is not currently available and will not be available in the short term. There will be a separate process to identify prospective GDF sites over the longer term.

2.80. It is considered that this is an alternative that cannot be assessed as it is not possible to restrict the number of potentially suitable individual sites. Geological suitability can only be demonstrated through extensive physical investigations at chosen sites.

2.81. On this basis, **it is concluded that it is not a reasonable alternative to be taken forward for consideration in the assessment**.

Summary of preferred approach and reasonable alternatives

2.82. The **preferred approach to the NPS at this stage is a non-site specific NPS** focussing on the high level assessment principles against which development consent applications will be considered for any future geological disposal infrastructure for higher activity wastes in England.

2.83. The reasonable alternatives to the non-site specific NPS that, along with the non-site specific NPS itself, have been taken forward for appraisal within the AoS are as follows:

- **a non-site specific NPS that includes exclusionary criteria**. Such criteria may be included on the grounds of landscape, cultural and natural heritage and nature conservation; and
- **a no NPS option** which is based on existing national planning policy to guide the development of any future geological disposal infrastructure for higher activity radioactive waste in England.

3. Context and baseline

Introduction

3.1. This section, alongside **Appendix B**, provides an overview of the context and baseline information that has informed the development of the appraisal framework used to assess the draft NPS and reasonable alternatives (see **Section 4**). It includes details of the review of other relevant plans and programmes and baseline data and culminates in the identification of key issues to be considered by the draft NPS and AoS.

3.2. Baseline information and relevant plans and programmes have been considered for England, Wales and Scotland. The proposed geographical scope of the context and baseline has been arrived at through consideration of the fact that, although the NPS specifically concerns GDF (and deep borehole) projects in England only, there is the potential for cross-boundary effects in Scotland and Wales given their common borders with, and geographical proximity to, England.

3.3. Annex I of the SEA Directive (and Schedule 2 of the SEA Regulations) requires that the appraisal of the draft NPS should include information on the "likely significant effects on the environment, including on issues such as: biodiversity; population; human health; fauna; flora; soil; water; air; climatic factors; material assets; cultural heritage, including architectural and archaeological heritage; landscape; and the inter-relationship between the issues referred to". These topics have formed the basis for the collection and analysis of contextual and baseline information alongside additional socio-economic topics. **Table 3.1** presents how the topics in this report are consistent with the SEA Directive requirements.

Table 3.1 Topics considered in this AoS Report

Annex I SEA Directive Effects	Topics Considered in this AoS Report
Biodiversity, Flora and Fauna	Biodiversity and Nature Conservation
Population	Population, Economics and Skills
Human Health	Human Health
Soil	Land Use, Geology and Soils
Water	Water Quality (including surface and ground water quality and availability)
Air	Air Quality
	Noise
Climatic Factors	Climatic Factors (including climate change mitigation and adaptation and energy)
	Flood Risk and Coastal Change
Material Assets	Waste and Resources

Annex I SEA Directive Effects	Topics Considered in this AoS Report
	Traffic and Transport
Cultural Heritage, including architectural and archaeological heritage	Cultural Heritage (including architectural and archaeological heritage)
Landscape	Landscape and Townscape

3.4. Consistent with the requirements of Annex 1 (b), (c) and (d) of the SEA Directive, **Appendix B** sets out the collated contextual and baseline information, on a topic-by-topic basis, for each of the 13 AoS topics above.

Review of plans and programmes

3.5. One of the first steps in undertaking the AoS (and to meet the requirements of the SEA Directive) is to identify and review other relevant plans, programmes, policies and strategies (hereafter referred to as 'plans and programmes') that could have an effect on the draft NPS. These may be plans and programmes at an international/European, UK or national level, as relevant to the scope of the NPS. The initial AoS Scoping Report included a review of plans and programmes, consistent with the requirements of the SEA Directive, and which informed the development of the appraisal framework. This review was updated as part of the preparation of the Final Scoping Report to take into account consultation responses to the initial Scoping Report and relevant plans and programmes that have been recently published.

3.6. The summary within each topic section in **Appendix B** identifies the relationships between the draft NPS and these other documents; i.e. how the NPS could be affected by the other plans' and programmes' aims, objectives and/or targets, or how it could contribute to the achievement of any environmental and sustainability objectives and targets set out in these plans and programmes.

3.7. The review of plans and programmes has also informed the environmental and socio-economic baseline and helped determine the key sustainability issues for the NPS and AoS. It has also provided the policy context for the appraisal of the draft NPS.

3.8. From the review of these plans and programmes, a number of key environmental protection and socio-economic objectives have been identified. These are summarised in **Table 3.2**, along with an indication of where the policy objectives are reflected in the AoS objectives (discussed further in **Section 4**). The key objectives have been structured around the AoS topics set out in **Table 3.2**.

3.9. On 23 June 2016, the EU referendum took place and the people of the United Kingdom voted to leave the European Union. Until exit negotiations are concluded, the UK remains a full member of the European Union and all the rights and obligations of EU membership remain in force. During this period, the Government will continue to negotiate, implement and apply EU legislation. The outcome of these negotiations will determine what arrangements apply in relation to EU legislation in future once the UK has left the EU[55].

[55] In so far as the context permits or requires, a reference to the European Union includes a reference to the European Atomic Energy Community.

Table 3.2 Summary of key objectives identified from the review of plans and programmes relevant to the AoS

Topic	Summary Objectives From Other Plans and Programmes	AoS Objectives Link (see Section 4)
1. Biodiversity and Nature Conservation	**International:** • to protect international/European protected wildlife areas (including Special Areas of Conservation, Special Protection Areas and Ramsar sites); • to contribute to the conservation of global biodiversity; • to ensure the conservation and enhancement of natural heritage including wetland conservation; • to ensure the conservation of biodiversity in order to continue to harness the derived health and wellbeing benefits for the population; • to identify where operators are financially liable for threats of or actual damage to the environment under the "polluter pays" principle; and • to anticipate, prevent and act on causes of significant reduction or loss of biodiversity. **UK, England, Scotland and Wales:** • to conserve and enhance biological diversity within the UK; • to ensure that the quality of habitats and biodiversity is enhanced or at least conserved and take account of key priority habitats and species in decision making; • to protect the network of nationally protected wildlife areas (including Sites of Special Scientific Interest); • to create an ecological network which is resilient to changing pressures; and • to safeguard vulnerable non-renewable resources for future generations.	Objective 1: Biodiversity and Nature Conservation Objective 3: Human Health Objective 4: Land Use, Geology & Soils Objective 5: Water Quality Objective 6: Flood Risk and Coastal Change Objective 9: Climatic Factors
2. Population, Econo**mics and Skills**	**International:** • to achieve economic development and reduction of inequalities whilst adhering to the principles of social and environmental justice and sustainable development; • to promote full employment, quality and productivity at work and promote inclusion by addressing disparities in access to labour markets; • to promote the economic development of disadvantaged areas within the European Union; • to grant public rights to information, public participation and access to justice; and • to undertake appropriate consultation with consultation bodies and the public. **UK, England, Scotland and Wales:**	Objective 2: Population, Economics and Skills Objective 3: Health

Topic	Summary Objectives From Other Plans and Programmes	AoS Objectives Link (see Section 4)
	• to create strong, prosperous and sustainable communities; • to narrow the gap between deprived neighbourhoods and the rest of the UK; • to remove barriers to growth; • to develop and support successful, thriving, safer and inclusive urban and rural communities whilst continuing to protect the open countryside for the benefit of all; • to support the transition to a low carbon economy; • to develop a culture of innovation and research and development; and • to enhance educational attainment and skills.	
3. Human Health	**International:** • to ensure children have safe water and clean air; • to ensure that measures to improve the health and wellbeing of the population are appropriately supported; • to preserve, protect and improve the quality of the environment and to protect human health; • to promote good health throughout the lifespan of the population; • to reduce inequities in health; • to prevent critical health effects as a result of high levels of noise in and around dwellings; • to avoid, prevent or reduce the harmful effects including annoyance due to exposure to environmental noise; and • to protect against the risks associated with ionising radiation, from artificial sources used widely in medicine, general industry and nuclear enterprises, and from naturally occurring sources. **UK, England, Scotland and Wales:** • to reduce and where possible avoid the effects and causes of statutory nuisance and to comply with all relevant UK environmental legislation; • to minimise the adverse impact of noise without placing unreasonable restrictions on development or adding unduly to the costs and administrative burdens of business; • to ensure noise reduction occurs where there may be adverse impacts of noise on human health; • to protect and enhance the quality of the environment, including the availability of green space; • to promote good health and good quality of life through the effective management of noise in the context of Government policy on sustainable development; and • to maintain and enhance public and worker safety	Objective 2: Population, Economics and Skills Objective 3: Health

Topic	Summary Objectives From Other Plans and Programmes	AoS Objectives Link (see Section 4)
	through restriction of exposure and control and design features.	
4. Land Use, Geology and Soils	**International:** • to protect soil on the basis of the principles of: preservation of soil functions; prevention of soil degradation; mitigation of its effects; and restoration of degraded soils; • to take precautionary measures where soil function may be affected; • to identify areas at risk of erosion, organic matter decline, salinisation, compaction and landslides; and • to limit the introduction of dangerous substances into the soil, to avoid accumulation in soil that would hamper soil functions and create a risk to human health and the environment. **UK, England, Scotland and Wales:** • to ensure contaminated land is identified and remediated where appropriate; • to protect and preserve the environment and guard against pollution to land; • to preserve, where possible, the best and most versatile agricultural land; • to promote more sustainable patterns of development; • to adopt a sustainable approach to land use though consideration of: economic development, social inclusion, environmental protection and prudent use of resources; • to promote development of previously developed land; • to protect and enhance geological conservation interests and soils; • to safeguard workable resources and ensure that an adequate and steady supply is available to meet the needs of the construction, energy and other sectors; and • to secure the sustainable restoration of sites to a relevant use after operation has ceased.	Objective 1: Biodiversity and Nature Conservation Objective 3: Health Objective 4: Land Use, Geology and Soils Objective 5: Water
5. Water Quality (including surface and ground water quality and availability)	**International:** • to ensure that the water and ecological quality of freshwater and marine environments is conserved and enhanced; • to ensure sustainable use of water resources and reduced pollution and physical impacts; • to facilitate the integrated management of both the coastal zone and River Basin Districts to ensure sustainable use and protection of resources; • to encourage the sustainable use of water resources and protect aquatic ecology, drinking	Objective 1: Biodiversity and Nature Conservation Objective 3: Health Objective 4: Land Use, Geology and Soils Objective 5: Water

Topic	Summary Objectives From Other Plans and Programmes	AoS Objectives Link (see Section 4)
	water and bathing waters; • to protect the environment from the adverse effects of urban waste water discharges and discharges from industrial processes; • to prevent the pollution of groundwater; • to protect the health of European water consumers; and • to encourage the uptake of Sustainable Drainage Systems (SuDS). **UK, England, Scotland and Wales:** • to protect and enhance the water environment in a way that allows it to adjust flexibly to a changing climate; • to manage water resources sustainably without causing environmental damage; • to increase water efficiency and maintain and enhance water quality; • to maintain and enhance the quality of water sources; • to understand and manage diffuse pollution sources; • to reduce pressure on the environment caused by water taken for human use; promote water use efficiency; and protect vital water supply infrastructure; and • to improve quality of the UK water environment and the ecology which it supports.	
6. Flood Risk and Coastal Change	**International:** • to reduce and manage the risks that floods pose to human health, the environment, cultural heritage and economic activity; and • to provide a consistent approach to managing flood risk across Europe. **UK, England, Scotland and Wales:** • to reduce the threat of flooding to people and their property; avoid inappropriate development in areas at risk of flooding; and sustainably manage risks from flooding and coastal erosion; • to ensure that policies and decisions in coastal areas are based on an understanding of coastal change over time; • to enable an appropriate and consistent approach to marine planning across UK waters, and to ensure the sustainable use of marine resources and strategic management of marine activities from renewable energy to nature conservation, fishing, recreation and tourism; and • to prevent new development from being put at risk from coastal change.	Objective 2: Population, Economics and Skills Objective 3: Health Objective 5: Water Objective 6: Flood Risk and Coastal Change Objective 9: Climatic Factors

Topic	Summary Objectives From Other Plans and Programmes	AoS Objectives Link (see Section 4)
7. Air	**International:** • to promote cleaner transport technologies and manage the demand for transport to prevent detrimental effects to human health from air pollution; • to ensure that air quality is enhanced or at least maintained and ensure that measures are adopted to support continued air quality standards; • to monitor and reduce trans-boundary atmospheric pollution; • to maintain air quality where it is good and improving; • to attain levels of air quality that do not give rise to significant negative impacts on, and risks to, human health and the environment; and • to reduce emissions from industrial processes. **UK, England, Scotland and Wales:** • to improve air quality and reduce the impact of air pollution on human health; • to improve air quality and reduce the impact of air pollution on biodiversity; and • to ensure new development is appropriate for its location and takes into account effects of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution.	Objective 1: Biodiversity and Nature Conservation Objective 3: Health Objective 4: Land Use, Geology and Soils Objective 5: Water Objective 7: Air
8. Noise	**International:** • to ensure that measures to improve the health and wellbeing of the population are appropriately supported; • to preserve, protect and improve the quality of the environment and to protect human health; • to prevent critical health effects as a result of high levels of noise in and around dwellings; and • to avoid, prevent or reduce the harmful effects including annoyance due to exposure to environmental noise. **UK, England, Scotland and Wales:** • to reduce and where possible avoid the effects and causes of statutory nuisance and to comply with all relevant UK environmental legislation; • to minimise the adverse impact of noise without placing unreasonable restrictions on development or adding unduly to the costs and administrative burdens of business; and • to ensure noise reduction occurs where there may be adverse impacts of noise on human health.	Objective 1: Biodiversity and Nature Conservation Objective 2: Population, Economics and Skills Objective 3: Health Objective 8: Noise
9. Climatic Factors (including climate	**International:**	Objective 1: Biodiversity

Topic	Summary Objectives From Other Plans and Programmes	AoS Objectives Link (see Section 4)
change and adaptation)	• to prevent 'dangerous' human interference with the climate system, namely through reductions in the emissions of greenhouse gases; • to promote renewable energy sources; • to promote sustainable development with regards to energy development, efficiency and consumption, transportation, industrial development, terrestrial and marine resource development and land use; • to reduce emissions of carbon dioxide and combat the serious threat of climate change; • to enable Europe's transition into a low-carbon economy and increase its energy security; and • to ensure that energy efficiency measures are put in place and, where possible, renewables are employed to contribute to appropriate climate change targets. **UK, England, Scotland and Wales:** • to improve carbon management and help the transition towards a low carbon economy; • to promote climate change risk management in all aspects of business to ensure future resilience for communities, businesses and the environment; • to pursue new development in places that are resilient to climate change; and in ways that are consistent with social cohesion and inclusion; • to conserve and enhance biodiversity, recognising that the distribution of habitats and species will be affected by climate change; and • to reduce energy consumption, minimise detrimental effects on the climate from greenhouse gases and maximise resilience to climate change.	and Nature Conservation Objective 2: Population, Economics and Skills Objective 3: Health Objective 5: Water Objective 6: Flood Risk and Coastal Change Objective 7: Air Objective 9: Climatic Factors Objective 11: Traffic and Transport
10. Waste and Resources	**International:** • to ensure that waste reduction is at the forefront of waste management and where disposal is unavoidable, ensure a high level of protection for the environment and human health; • to adopt waste management principles such as the 'polluter pays principle', the 'waste hierarchy' and 'circular economy'; • to protect human health and the environment against harmful effects caused by the collection, transport, treatment, storage and tipping of waste; • to help Europe become a recycling society that seeks to avoid waste and uses waste as a resource; • to ensure the prudent use of resources; • to achieve and maintain a high level of safety worldwide in spent fuel and radioactive waste management; • to ensure there are effective defences against	Objective 1: Biodiversity and Nature Conservation Objective 3: Health Objective 4: Land Use, Geology and Soils Objective 5: Water Objective 7: Air Objective 9: Climatic Factors Objective 10: Waste and Resources

Topic	Summary Objectives From Other Plans and Programmes	AoS Objectives Link (see Section 4)
	potential hazards so that individuals, society and the environment are protected now and in the future; and • to prevent accidents with radiological consequences and to mitigate their consequences should they occur. **UK, England, Scotland and Wales:** • to decouple waste growth (in all sectors) from economic growth and put more emphasis on waste prevention and re-use; • to increase diversion from landfill of municipal and non-municipal waste and secure better integration of treatment for all waste; • to ensure waste is disposed of as near as possible to the place of production; • to ensure the layout and design of new development supports sustainable waste management; • to make best use of resources currently in use, reducing as far as practicable the quantity of material used and waste generated, and using as much recycled and secondary material as possible, before securing the remainder of material needed through new primary extraction; • to safeguard workable resources and ensure that an adequate and steady supply is available to meet the needs of the construction, energy and other sectors; • to minimise the impacts of aggregate extraction on local communities, built and natural heritage, and the water environment; and • to place higher activity waste out of reach and therefore improve security.	
11. Traffic and Transport	**International:** • to achieve a 60% cut in transport emissions by 2050 through: no more conventionally-fuelled cars in cities, 40% use of sustainable low carbon fuels in aviation; and a 50% shift of medium distance intercity passenger and freight journeys from road to rail and waterborne transport. **UK, England, Scotland and Wales:** • to encourage sustainable local travel and economic growth by making public transport and cycling and walking more attractive and effective, promoting lower carbon transport and tackling local road congestion; • to integrate planning and transport to promote more sustainable transport choices, promote accessibility to jobs, shopping, leisure facilities and services by public transport, walking and cycling and to reduce the need to travel, especially by car; • to promote patterns of development which optimise	Objective 1: Biodiversity and Nature Conservation Objective 2: Population, Economics and Skills Objective 3: Health Objective 10: Traffic and Transport

Topic	Summary Objectives From Other Plans and Programmes	AoS Objectives Link (see Section 4)
	the use of existing infrastructure, reduce the need to travel, provide safe and convenient opportunities for walking and cycling for both active travel and recreation, enable the integration of transport modes and facilitate freight movement by rail or water; and • to deliver national networks that meet long-term needs; supporting a prosperous and competitive economy and improving overall quality of life, as part of a wider transport system.	
12. Cultural Heritage	**International:** • to identify, protect and preserve World Heritage Sites; • to protect and sustain the historic environment for the benefit of current and future generations; • to identify and protect important heritage features; and • to collect and disseminate scientific information on cultural and archaeological heritage to aid conservation and public awareness. **UK, England, Scotland and Wales:** • to protect listed buildings, scheduled monuments and buildings within conservation areas; • to protect and promote stewardship of the historic environment; • to promote positive planning and management to bring about sensible solutions to the treatment of sites with archaeological remains and to reduce the areas of potential conflict between development and preservation; • to protect heritage assets and their wider settings; and • to safeguard internationally and nationally-designated historically or culturally significant sites.	Objective 1: Biodiversity and Nature Conservation Objective 2: Population, Economics and Skills Objective 3: Human Health Objective 4: Land Use, Geology and Soils Objective 12: Cultural Heritage Objective 13: Landscape and Townscape
13. Landscape and Townscape	**International:** • to ensure that development is 'appropriate' particularly in relation to protected landscapes; and • to protect, manage and plan for landscape change throughout Europe. **UK, England, Scotland and Wales:** • to conserve and enhance nationally designated landscapes (Areas of Outstanding Natural Beauty and National Parks); • to maintain the character of the undeveloped coast, protecting and enhancing its distinctive landscapes, particularly in areas defined as Heritage Coast; • to provide public access to the countryside and promote sustainable farming and protection of wildlife; • to retain attractive landscapes, and enhance	Objective 1: Biodiversity and Nature Conservation Objective 2: Population, Economics and Skills Objective 3: Human Health Objective 4: Land Use, Geology and Soils Objective 12: Cultural Heritage Objective 13: Landscape and Townscape

Topic	Summary Objectives From Other Plans and Programmes	AoS Objectives Link (see Section 4)
	landscapes near to where people live; • to improve damaged and derelict land around towns; • to work within the framework of landscape to help shape future places and manage change everywhere; and • to retain land in agricultural, forestry and related uses.	

Collecting baseline evidence

3.10. An essential part of the SEA compliant AoS process is to identify the current state of the environment and its likely evolution under a 'business as usual' scenario. Only with sufficient knowledge of the existing baseline conditions can the likely significant effects of the draft NPS be identified and appraised. Compliance with the SEA Directive also requires that the actual effects of implementing the NPS on baseline conditions are monitored.

3.11. To inform the baseline analysis contained in **Appendix B**, information has been used from a variety of sources including, amongst others, the Department for Environment, Food and Rural Affairs (Defra), BEIS, the Environment Agency, Natural England, Historic England, the Office for National Statistics, Welsh Government, Natural Resources Wales and the Scottish Environment Protection Agency. Consultation responses received on the initial AoS Scoping Report have also been taken into account and **Appendix B** updated as appropriate in order to ensure that the baseline evidence is sufficiently robust to support the AoS of the draft NPS.

3.12. As set out above, the baseline analysis represents a 'business as usual' scenario in order to provide the basis for the assessment of the draft NPS. In this context, it does not reflect the implementation of Government policy on disposal of higher activity waste and the development of a GDF. The baseline contained in **Appendix B** is therefore separate and distinct from the no NPS reasonable alternative outlined in **Section 2**.

Key issues relevant to the draft NPS

3.13. From the analysis of current and projected baseline conditions, a number of issues have been identified as being relevant to the draft NPS. These are summarised in **Table 3.3**. Against each topic, the reference to the AoS objectives indicates how these issues have been reflected within the appraisal framework (see **Section 4**).

Table 3.3 Key issues relevant to the draft NPS

Topic	Summary of Key Issues	AoS Objectives link (see Section 4)
1. Biodiversity and Nature Conservation	• Special Areas of Conservation (SACs), Sites of Community Importance (SCIs), Special Protection Areas (SPAs) and Ramsar sites are important for biodiversity at the international level. The total	Objective 1: Biodiversity and Nature Conservation Objective 3: Human Health

Topic	Summary of Key Issues	AoS Objectives link (see Section 4)

	extent of land and sea in the UK protected by national and international designations has increased from 10.8 million hectares in December 2010 to 17 million hectares at the end of July 2015, comprising 2.6 million hectares on land and 14.4 million hectares at sea.
	• Over the period 1999-2005, the national conservation agencies carried out a programme of monitoring of the designated features of SSSI, SACs, SPAs and Ramsar sites. Some 57% of SSSI sites, 37% of SACs, 86% of Ramsar sites and 78% of SPAs were reported as in favourable condition.
	• A Defra index describing the population trends of the 213 UK priority species had fallen by 67% since 1970, although, there was no significant decline in the period between 2007 and 2012. Species, such as the Bittern, Cirl Bunting and the many species of bats are recovering.
	• A Joint Nature Conservation Committee assessment of the status of UK habitats of European importance reports that in 2013, 3% of UK terrestrial habitats listed in Annex I of the Habitats Directive were in favourable conservation status, 31% were found to be improving, 38% were stable and 25% were declining.
	• Key pressures and risks in respect of biodiversity and nature conservation that are relevant include:
	  ◦ habitat loss and fragmentation by development;
	  ◦ agricultural intensification and changes in agricultural management practices;
	  ◦ water abstraction, drainage or inappropriate river management;
	  ◦ inappropriate coastal management;
	  ◦ lack of appropriate habitat management;
	  ◦ atmospheric pollution (acid precipitation, nitrogen deposition);
	  ◦ water pollution from both point and wider (diffuse) agricultural sources;
	  ◦ climate change and sea level rise;
	  ◦ sea fisheries practices;
	  ◦ recreational pressure and human disturbance; and
	  ◦ invasive and non-native species.
		Objective 4: Land Use, Geology & Soils
		Objective 5: Water Quality
		Objective 6: Flood Risk and Coastal Change
		Objective 9: Climatic Factors

2. Population, Economics and Skills	• The growing population within the UK will increase population densities and, in turn, could increase the likelihood of communities being within proximity to a GDF or transport of high level waste and	Objective 2: Population, Economics and Skills Objective 3: Human Health

Topic	Summary of Key Issues	AoS Objectives link (see Section 4)
	intermediate level waste. This could increase the likelihood of operations having, or being perceived to have, a negative impact on communities. • The respective indicators and areas of multiple deprivation in England, Scotland and Wales are similar in that there continues to be deprivation in specific areas. • There are current uncertainties over future market conditions, following the UK's vote to leave the European Union; however, as the Bank of England notes, UK economic activity remained resilient in the second half of 2016 with GDP growth likely to be 2% in 2017. With a fall in the exchange rate and likely rises in inflation, the Bank of England expects business investment to fall and consumer spending to slow in the medium term. The Bank of England also notes uncertainty over the long term, as the outlook will depend on the UK's post-Brexit trading arrangements and their impact on the economy.	
3. Human Health	• Health inequalities exist in many communities. This is due to a number of factors (and the interplay between them) including housing quality, economic wellbeing, employment, lifestyle, heredity factors, cultural and environmental factors. • Sustained exposure to elevated air pollution levels (including exposure to elevated concentrations of particulate matter, oxides of nitrogen and sulphur) contributes to respiratory illness. • Health problems associated with radiological exposure are generally a minor issue in the UK; the great majority of the average public dose comes from natural sources of radiation. Background levels of natural radiation vary considerably from area to area with variations being significantly larger than public dose limits. Discharges from a GDF, meanwhile, would be far below public dose limits and below background radiation. However, the presence of a GDF could cause anxiety and stress due to concerns regarding radiation.	Objective 2: Population, Economics and Skills Objective 3: Human Health
4. Soil (including geology and land use)	• The principal land uses in the UK are grassland, arable/horticulture and forestry. The 2011 UK National Ecosystem Assessment classifies 6.8% of the UK's land area as urban. • Approximately 1.6% of the land in the UK has been affected by contamination from industrial activity, although this is being addressed as sites are redeveloped. • Mining activities have left a legacy of localised hazards in some parts of the UK such as landslips, subsidence, contamination of ground and surface water sources from metals such as tin, copper and arsenic, and radon gas and flooding. • Disturbance of contaminated sites carries the risk of	Objective 1: Biodiversity and Nature Conservation Objective 3: Human Health Objective 4: Land Use, Geology and Soils Objective 5: Water Quality

Topic	Summary of Key Issues	AoS Objectives link (see Section 4)
	pollution pathways being created or re-opened for any existing ground contamination. • There is currently increasing pressure on rural and agricultural land from developers as urban areas expand. Future population growth leading to an increase in the need for housing and related urban development infrastructure will put more pressure on protected land including important geological sites. • Soils in England continue to be affected by human actions including intensive agriculture, historic levels of industrial pollution and urban development, making them vulnerable to erosion (by wind and water), compaction and loss of organic matter. • As the climate (including temperature and rainfall patterns) changes in the future, it is likely that soils have the potential to be further degraded, as a result of both the direct and indirect impacts of climate change.	
5. Water Quality (including surface and ground water quality and availability)	• Coastal, estuarine and river water quality has improved since 1990. • There is growing pressure on water resources in parts of the UK, particularly the south east and east of England. • Climate change is expected to have significant impacts on the water environment. Areas where the underlying geology is generally impermeable are expected to be particularly affected as river flows would be likely to fall to low levels in drier periods and quickly react to rainfall episodes. • There is a need to ensure that there is sufficient water infrastructure in place to accommodate future growth in the UK. • There is a legacy of groundwater pollution in the UK from historical mining and other industrial activities, although this is being addressed as sites are remediated as part of site redevelopment.	Objective 1: Biodiversity and Nature Conservation Objective 3: Human Health Objective 4: Land Use, Geology and Soils Objective 5: Water Quality
6. Flood Risk and Coastal Change	• Some 15% of UK properties are at risk from flooding (surface water, river or coastal), although the degree of risk varies. • The UK Climate Change Risk Assessment 2017: Projections of future flood risk projected that the number of residential properties exposed to flooding more frequently than 1:75 years (on average) increases from 860,000 today to between 1.2 million and 1.7 million properties in 2080, depending on the scenario considered. • Sea levels are rising, with worst case scenarios of a 1.9m increase in sea level by 2100 (with up to 0.76m more likely). The south and east of England will experience the greatest effective increases, due	Objective 2: Population, Economics and Skills Objective 3: Human Health Objective 5: Water Quality Objective 6: Flood Risk and Coastal Change Objective 9: Climatic Factors

Topic	Summary of Key Issues	AoS Objectives link (see Section 4)
	to the effects of post-glacial rebalancing. • Many coastal sites (especially in the south and east of England) are already prone to erosion, due to their underlying geology, coupled with rising sea levels and increased storm intensity. Shoreline Management Plans (in England and Wales) are taking a long-term view of coastal change by identifying sustainable management approaches for up to the next 100 years. • Flood risk presents a significant planning issue in the development of major infrastructure projects, both in terms of potential direct impacts on the project itself and indirect impacts associated with works (such as increased run-off).	
7. Air Quality	• Air quality has improved in the UK over the last sixty years as a result of the switch from coal to gas and electricity for heating of domestic and industrial premises, stricter controls on industrial emissions, higher standards for the composition of fuel and tighter regulations on emissions from motor vehicles. However, poor air quality - particularly from vehicles - remains an issue for community health and for biodiversity, especially in/downwind of urban areas and major transport networks. • Poor air quality is generally associated with urban/industrial areas and major road infrastructure. A relatively large number of Air Quality Management Areas are located in urban areas, many of which have been designated due to high NO_2 and PM_{10} levels. • Historical emissions have resulted in high levels of sulphur and nitrogen deposits in wetter parts of the UK such as northern England and the Welsh uplands. This has resulted in acidification and nitrogen eutrophication in some areas. Around a third of the UK land area is sensitive to acid deposition and a third to eutrophication[56].	Objective 1: Biodiversity and Nature Conservation Objective 3: Human Health Objective 4: Land Use, Geology and Soils Objective 5: Water Quality Objective 7: Air
8. Noise	• Ambient noise levels are gradually rising in the UK as a result of an increasing - and increasingly mobile - population. The cumulative impacts of noise on sensitive groups in local communities may create or exacerbate existing health issues. • Road traffic is a dominant source of noise. • There is a need to address noise issues in the UK's most affected communities.	Objective 1: Biodiversity and Nature Conservation Objective 2: Population, Economics and Skills Objective 3: Human Health Objective 8: Noise

[56] Eutrophication is the enrichment of an ecosystem with chemical nutrients, typically compounds containing nitrogen and phosphorus, and whilst it can be natural, can also be man-made. Man-made eutrophication is commonly associated with elevated levels of nutrient enrichment arising from waste water treatment works discharges into rivers which can lead to algal blooms, decomposition or organic matter and deoxygenation of waters.

Topic	Summary of Key Issues	AoS Objectives link (see Section 4)
9. Climatic Factors (including climate change and adaptation and flood risk)	• The input of greenhouse gasses (e.g. CO_2, CH_4, N_2O, O_3) resulting from fossil fuel usage, agriculture and other land use have been linked with atmospheric warming and undesirable climate change. • Fossil fuel dependency remains high and is likely to remain so for some time. • Legally binding EU and government targets (see: the Climate Change Act 2008 and subsequent revisions: The Climate Change Act 2008 (2020 Target, Credit Limit and Definitions) Order 2009, The Carbon Budgets Order 2009) seek to reduce emissions (based on a carbon budget of MtCO2 equivalent) by 80% on 1990 levels by 2050. The UK Government has confirmed its intention within the Fifth Carbon Budget to reduce UK greenhouse gas emissions by 57% by 2030 relative to 1990 levels. • Changes in temperature and rainfall patterns, along with more frequent extreme weather events creates the situation where a greater degree of resilience will have to be incorporated into plans and proposals. • The UK's Climate Projections (UKCP09) show that the UK as a whole is likely to experience hotter, drier summers, warmer, wetter winters and rising sea levels, particularly in the south east of England. This is likely to have a significant effect on a range of environmental conditions, including the water environment. • Sensitive ecosystems and UK water resources are likely to come under increasing pressure as a result of climate change.	Objective 1: Biodiversity and Nature Conservation Objective 2: Population, Economics and Skills Objective 3: Human Health Objective 5: Water Quality Objective 6: Flood Risk and Coastal Change Objective 7: Air Objective 9: Climatic Factors Objective 11: Traffic and Transport
10. Waste and Resources	• The total amount of municipal and commercial and industrial waste produced each year is likely to decrease in coming years. • The consumption of non-renewable sources will deplete overall stocks and result in a scarcity of resources for future generations. • Facilities for disposing of higher activity wastes, which include low level waste not suitable for near-surface disposal, intermediate level waste and high level waste, have yet to be developed in the UK.	Objective 1: Biodiversity and Nature Conservation Objective 3: Human Health Objective 11: Traffic and Transport
11. Traffic and Transport	• There are areas of the UK's transport network which are stretched beyond their capacity at peak times. • Increasing levels of congestion are being experienced on the UK's road network. • There is a need for investment in transportation infrastructure to meet future demand and support economic growth. • There is a need to reduce the need to travel and	Objective 2: Population, Economics and Skills Objective 12: Cultural Heritage Objective 13: Landscape and Townscape

Topic	Summary of Key Issues	AoS Objectives link (see Section 4)
	facilitate a shift towards more sustainable modes of transport. • The transportation of radiological materials by road and rail in the UK is controlled by the Office for Nuclear Regulation and the Department for Transport and any movements associated with a GDF would be small. However, the transportation of construction workers and non-radioactive materials and wastes associated with the construction of a GDF could have adverse impacts on local communities.	
12. Cultural Heritage	• The UK has over 459,000 listed buildings, approximately 33,720 scheduled monuments, 2,416 historic parks and gardens, in excess of 10,259 conservation areas and 28 World Heritage Sites. • The settings of some heritage assets are at risk from new development. • Scheduled monuments in rural areas are at risk from agricultural practices, land disturbance and unrestricted plant, scrub or tree growth.	Objective 1: Biodiversity and Nature Conservation Objective 2: Population, Economics and Skills Objective 3: Human Health Objective 4: Land Use, Geology and Soils Objective 12: Cultural Heritage Objective 13: Landscape and Townscape
13. Landscape and Townscape	• Some 10% of the UK is covered by National Parks, with other designations extending the area of landscape covered by a further 15%. • Natural England reported that in 2008, existing landscape character was being maintained in 51% of England's landscapes, whilst in a further 10%, existing character was being enhanced. For 19% of areas, new landscape characteristics were emerging, whilst the remaining 20% showed some signs of neglect. • Key issues that could affect England's landscape could include the effects of climate change (and effects arising from the increased frequency and intensity of storm and flood events, increased likelihood of droughts and the anticipated increased in wildfires), changes to agricultural practices, new energy infrastructure and development pressures. • The Scottish landscape is vulnerable to a variety of pressures. Key threats and opportunities to landscape character include the development of new infrastructure, agriculture, the loss and expansion of woodland and natural processes. • In Wales, changes in weather patterns and soil conditions will alter the vegetation that is an important landscape feature. Climate change can also have an effect on flooding or increases in temperatures may also present challenges for the landscape. Coastal areas may be most at risk. Responses to changing climate such as the introduction of new crops and land uses will also	Objective 1: Biodiversity and Nature Conservation Objective 2: Population, Economics and Skills Objective 3: Human Health Objective 4: Land Use, Geology and Soils Objective 12: Cultural Heritage Objective 13: Landscape and Townscape

Topic	Summary of Key Issues	AoS Objectives link (see Section 4)
	have an impact on the visual appearance of the landscape. • Light pollution appears to have increased considerably over the last 30-40 years over much of the UK. The growth of urban areas, road networks and industrial areas are all major contributors to increased light levels.	

Limitations of the data

3.14. Data have generally been sourced from national bodies to enable comparison between baseline information for England, Scotland and Wales. However, in some cases baseline information collected by national bodies differs meaning that data are not directly comparable.

3.15. The information used has been sourced, so far as is possible, from the most recent datasets available utilising a wide range of authoritative and official sources. It is important to acknowledge that there are variable time lags between raw data collection and its publication. Consequently, at the time of this AoS Report's publication, the baseline or predicted future trends may have varied from those described above and in **Appendix B**.

4. Appraisal methodology

Introduction

4.1. This section describes how the appraisal of the draft NPS (including reasonable alternatives) has been undertaken. It draws on the information presented in **Section 2**, **Section 3** and **Appendix B**, as well as the responses received to consultation on the initial AoS Scoping Report, to define the scope of the appraisal (in terms of the environmental and socio-economic issues considered) and sets out the appraisal framework. The appraisal framework includes AoS objectives and guide questions supported by definitions of significance that are intended to help the reader understand how the appraiser has determined the effects of the draft NPS against the AoS objectives. The section also highlights the difficulties encountered during the appraisal process.

Scope of the appraisal

Topics

4.2. The range of potential environmental and socio-economic effects under consideration has been informed primarily by the SEA Directive and implementing regulations, using published government guidance, along with an evaluation of existing information on the potential effects of a GDF (and related deep boreholes)[57]. As discussed in **Section 3**, Annex I of the SEA Directive and Schedule 2 of the SEA Regulations requires that the assessment includes information on the "likely significant effects on the environment, including on issues such as: biodiversity; population; human health; fauna; flora; soil; water; air; climatic factors; material assets; cultural heritage, including architectural and archaeological heritage; landscape; and the inter-relationship between the issues referred to". The scope of the draft NPS presented in **Section 2** and the outputs from the review of other relevant plans and programmes and baseline information have also been used to define the scope of the appraisal.

4.3. In **Table 4.1**, each of the 12 SEA topic areas listed above are considered in turn. All of these topic areas have been addressed in the AoS.

[57] Including:

- Radioactive Waste Management Ltd (2016) Geological Disposal: Generic Environmental Assessment;
- Radioactive Waste Management Ltd (2016) Geological Disposal: Generic Socio-economic Assessment;
- Radioactive Waste Management Ltd (2016) Geological Disposal: Generic Health Impact Assessment; and
- DECC (now BEIS) (2014) 'Implementing Geological Disposal: A framework for the long-term management of higher activity radioactive waste', available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/332890/GDF_White_Paper_FINAL.pdf

Table 4.1 Basis for scoping out topic areas from the AoS

SEA Topic Area	Included in the AoS of the Draft NPS?	Justification for Scoping the Topic out of the AoS
Biodiversity	Yes	Included within appraisal framework
Population	Yes	Included within appraisal framework
Human Health	Yes	Included within appraisal framework
Fauna	Yes	Included within appraisal framework
Flora	Yes	Included within appraisal framework
Soils	Yes	Included within appraisal framework
Water	Yes	Included within appraisal framework
Air	Yes	Included within appraisal framework
Climatic Factors	Yes	Included within appraisal framework
Material Assets	Yes	Included within appraisal framework
Cultural Heritage	Yes	Included within appraisal framework
Landscape	Yes	Included within appraisal framework

4.4. It should be noted that, whilst the appraisal of the draft NPS is presented on a topic-by-topic basis, where there are linkages between the impacts and effects identified (for example, the potential impact of vehicle movements on human health caused by associated emissions to air), this has been highlighted in the appraisal commentary as appropriate.

Geographic scope

4.5. The AoS has considered the potential effects of the draft NPS in England in addition to Scotland and Wales, given the envisaged potential for a GDF (or deep boreholes) in England to impact upon adjacent areas in Scotland and Wales (due to their common borders and geographical proximity).

4.6. In order to comply with the transboundary consultation requirements of the SEA Directive (Article 7) and SEA regulation 14 (1), consideration has been given to whether any likely significant negative effect would arise and whether there would be an effect on other areas and states. No such effects have been identified and no effects are anticipated on other states arising from the NPS. Further consideration of transboundary effects is presented in **Section 5**.

4.7. As noted in **Section 1**, the AoS relates to the NPS only and has not, therefore, considered site-specific proposals for a GDF or related deep boreholes.

Timescales

4.8. When considering the timing of potential effects of the draft NPS, the appraisal has classified effects as 'short-,' 'medium-' or 'long-term'. This reflects an intention to capture the differences that could arise at different timescales, consistent with the requirements of the Annex II (2) of the SEA Directive where the assessment of the effects should have regard to 'the probability, duration, frequency and reversibility of the effects'. **Table 4.2** below summarises the timescales applied in the AoS.

Table 4.2 Duration of short, medium and long term

Phase	Estimated Length (years)	Duration
Site identification and characterisation (including deep boreholes).	15 to 20 years	Short
GDF construction and operation (including ongoing construction of further underground waste vaults and waste emplacement).	20 to 170 years[58]	Medium
Closure and post closure monitoring.	170 years and beyond	Long

AoS objectives and guide questions

4.9. Establishing appropriate AoS objectives and guide questions is central to appraising the effects of the draft NPS. The AoS objectives and guide questions used in the appraisal of the draft NPS reflect the topics contained in Annex I of the SEA Directive and have been informed by:

- the review of plans and programmes and the associated environmental protection objectives (see **Section 3** and **Appendix B**);
- the baseline information and key sustainability issues (see **Section 3** and **Appendix B**);
- a broad understanding of the likely generic effects arising from geological disposal infrastructure; and
- responses received to consultation on the initial AoS Scoping Report.

4.10. Broadly, the AoS objectives present the preferred environmental and socio-economic outcome, which typically involves minimising detrimental effects and enhancing positive effects. Appraising the draft NPS against the AoS objectives helps to ensure the AoS has adequately covered the SEA topics.

4.11. Associated guide questions have been developed for each AoS objective to provide a detailed framework against which the draft NPS can be appraised. The appraisal objectives and guide questions are presented in **Table 4.3**. For the avoidance of doubt, the AoS objectives are not the same as the proposed NPS objectives.

[58] 150 years is referenced in the draft NPS (paragraph 1.5.2) as the operational period of a GDF.

Table 4.3 Appraisal objectives and guide questions

AoS Topic Area	AoS Objectives	Guide Questions	SEA Directive Topics
Biodiversity and Nature Conservation	1. To protect and enhance biodiversity (habitats, species and ecosystems) working within environmental capacities and limits.	• Will the Geological Disposal Infrastructure NPS protect and/or enhance internationally designated nature conservation sites e.g. SACs, SPAs and Ramsar Sites? • Will the Geological Disposal Infrastructure NPS protect and/or enhance nationally designated nature conservation sites e.g. SSSIs? • Will the Geological Disposal Infrastructure NPS affect animals or plants including protected species? • Will the Geological Disposal Infrastructure NPS protect and/or enhance priority species and habitats? • Will the Geological Disposal Infrastructure NPS affect the structure and function of natural systems (ecosystems)? • Will the Geological Disposal Infrastructure NPS affect public access to areas of wildlife interest? • Will the Geological Disposal Infrastructure NPS have an impact on fisheries?	Biodiversity, Flora and Fauna
Population, Economics and Skills	2. To promote a strong, diverse and stable economy with opportunities for all; improve education and skills, minimise disturbance to local communities and maximise positive social impacts.	• Will the Geological Disposal Infrastructure NPS affect the social infrastructure and amenities available to local communities? • Will the Geological Disposal Infrastructure NPS affect local population demographics and/or levels of deprivation in surrounding areas? • Will the Geological Disposal Infrastructure NPS affect opportunities for investment in education and skills development? • Will the Geological Disposal Infrastructure NPS affect the number or types of jobs available in local economies? • Will the Geological Disposal Infrastructure NPS affect how diverse and robust local economies are?	Population

AoS Topic Area	AoS Objectives	Guide Questions	SEA Directive Topics
Human Health	3. To protect and enhance health, safety and wellbeing of workers and communities and minimise any health risks associated with disposal operations.	• Will the Geological Disposal Infrastructure NPS protect and/or enhance the health and safety of workers, or other people working at any proposed sites? • Will the Geological Disposal Infrastructure NPS protect and/or enhance the health, safety and well-being of local communities and specific groups within those communities? • Will the Geological Disposal Infrastructure NPS protect and/or enhance the health, safety and well-being of wider communities (i.e. those communities that are not host to a GDF or deep boreholes)? • Will the Geological Disposal Infrastructure NPS disproportionately affect communities already identified as vulnerable/at risk? • Will the Geological Disposal Infrastructure NPS minimise the risk or consequences of a major accident?	Population Human Health
Land Use, Geology and Soils	4. To conserve and enhance soil and geology and contribute to the sustainable use of land.	• Will the Geological Disposal Infrastructure NPS have an effect on soil quality/function, variety, extent and/or compaction levels? • Will the Geological Disposal Infrastructure NPS increase the risk of significant land contamination? • Will the Geological Disposal Infrastructure NPS have an effect on any known and existing contamination? • Will the Geological Disposal Infrastructure NPS protect and/or enhance Geological Conservation Sites, important geological features and geophysical processes and functions? • Will the Geological Disposal Infrastructure NPS affect land stability? • Will the Geological Disposal Infrastructure NPS change patterns of land use including effects on best and most versatile land? • Will the Geological Disposal	Soils

AoS Topic Area	AoS Objectives	Guide Questions	SEA Directive Topics
		Infrastructure NPS affect induced seismicity?	
Water Quality (including surface and ground water quality and availability)	5. To maximise water efficiency, protect and enhance water quality and help achieve the objectives of the Water Framework Directive.	• Will the Geological Disposal Infrastructure NPS affect demand for water resources? • Will the Geological Disposal Infrastructure NPS affect the amount of waste water and surface runoff produced? • Will the Geological Disposal Infrastructure NPS protect and enhance the quality of surface, groundwater, estuarine and coastal water quality?	Water
Flood Risk and Coastal Change	6. To minimise the risks from coastal change and flooding to people, property and communities, taking into account the effects of climate change.	• Will the Geological Disposal Infrastructure NPS help to avoid development in areas of flood risk and, where possible, reduce flood risk? • Will the Geological Disposal Infrastructure NPS help to avoid development in areas affected by coastal erosion and not affect coastal processes and/or erosion rates?	Water Climatic Factors
Air	7. To minimise emissions of pollutant gases and particulates and enhance air quality, helping to achieve the objectives of the Air Quality and Ambient Air Quality and Cleaner Air for Europe Directives.	• Will the Geological Disposal Infrastructure NPS affect air quality? • Will the Geological Disposal Infrastructure NPS create a nuisance for people or wildlife (for example from dust or odours)?	Air
Noise	8. To minimise noise pollution and the effects of vibration.	• Will the Geological Disposal Infrastructure NPS help to minimise noise and vibration effects from construction and operational activities on residential amenity and effects on sensitive locations and receptors?	Human Health Fauna
Climatic Factors	9. To minimise greenhouse gas emissions as a contribution to climate change and ensure resilience to any consequences of climate change.	• Will the Geological Disposal Infrastructure NPS help to ensure a low carbon design solution to the disposal of higher activity radioactive waste, at both construction and operation phases? • Will the Geological Disposal Infrastructure NPS promote climate change adaptation	Climatic Factors

AoS Topic Area	AoS Objectives	Guide Questions	SEA Directive Topics
		(including rising temperatures and more extreme weather events)?	
Waste and Resources	10. To minimise waste arisings, promote reuse, recovery and recycling, minimise the impact of wastes on the environment and communities and contribute to the sustainable use of natural and material assets.	• Will the Geological Disposal Infrastructure NPS affect the amount of hazardous and non-hazardous wastes produced? • Will the Geological Disposal Infrastructure NPS affect the capacity of existing waste management systems, both nationally and locally? • Will the Geological Disposal Infrastructure NPS maximise re-use and recycling of recovered components and materials? • Will the Geological Disposal Infrastructure NPS help achieve government and national targets for minimising, recovering and recycling waste? • Will the Geological Disposal Infrastructure NPS increase the burden on limited natural resources? • Will the Geological Disposal Infrastructure NPS make best use of existing infrastructure and resources?	Material Assets
Traffic and Transport	11. To minimise the volume of traffic and promote more sustainable transport choices.	• Will the Geological Disposal Infrastructure NPS help to minimise traffic volumes? • Will the Geological Disposal Infrastructure NPS help to minimise the direct effects of transport such as noise and vibration, severance[59] of communities and wildlife habitats and safety concerns? • Will the Geological Disposal Infrastructure NPS encourage alternative and sustainable means of transporting freight, waste and minerals, where possible?	Biodiversity, Flora and Fauna Population Human Health
Cultural Heritage	12. To protect and where appropriate enhance the historic environment including cultural heritage resources,	• Will the Geological Disposal Infrastructure NPS affect designated or locally important archaeological features or their settings? • Will the Geological Disposal	Cultural Heritage

[59] Severance refers to the separation of communities by development such as roads.

AoS Topic Area	AoS Objectives	Guide Questions	SEA Directive Topics
	historic buildings and archaeological features and their settings.	Infrastructure NPS affect the fabric and setting of historic buildings, places or spaces that contribute to local distinctiveness, character and appearances?	
Landscape and Townscape	13. To protect and enhance landscape and townscape quality and visual amenity.	• Will the Geological Disposal Infrastructure NPS have significant visual impacts (including those at night)? • Will the Geological Disposal Infrastructure NPS affect protected/designated landscapes or their setting? • Will the Geological Disposal Infrastructure NPS affect the intrinsic character or setting of local landscapes or townscapes? • Will the Geological Disposal Infrastructure NPS help to minimise light pollution from construction and operational activities on residential amenity and on sensitive locations and receptors? • Will the Geological Disposal Infrastructure NPS affect public access to open spaces or the countryside?	Landscape Human Health

Completing the appraisal

Overview

4.12. In accordance with the Office of the Deputy Prime Minister (now Department for Communities and Local Government) Practical Guide to the SEA Directive[60], the appraisal process has sought to predict the likely significant effects of the draft NPS. This has been done by identifying the likely changes to the baseline conditions as a result of implementing the draft NPS (or reasonable alternative to the NPS). These changes have been described (where possible) in terms of their geographic scale, the timescale over which they could occur, whether the effects would be temporary or permanent, positive or negative, likely or unlikely, frequent or rare. Where numerical information is not available, the appraisal has been based on professional judgement and with reference to relevant legislation, regulations and policy. More specifically, in undertaking the appraisal, consideration has been given to:

[60] Office of the Deputy Prime Minister (ODPM) (now the Department for Communities and Local Government (DCLG)) (2005) 'A Practical Guide to the Strategic Environmental Assessment Directive', available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/7657/practicalguidesea.pdf

- baseline information including existing socio-economic and environmental problems and their evolution;
- the likely activities and potential sources of effects associated with the NPS, decision making and resulting infrastructure ((a) GDF(s) and (b) deep boreholes). With regard to the effects from the potential infrastructure, reference has been made to following assessment studies[61]:
  - Radioactive Waste Management Ltd (December 2016) Geological Disposal Generic Environmental Assessment Report;
  - Radioactive Waste Management Ltd (December 2016) Geological Disposal Generic Socio-economic Assessment; and
  - Radioactive Waste Management Ltd (December 2016) Geological Disposal Generic Health Impact Assessment.
- the regulatory framework;
- consultation with statutory consultees and other stakeholders;
- the AoS objectives and guide questions; and
- definitions of significance (see below).

Approach

4.13. Following a high level review of the draft NPS, it was determined that the following key components of the draft NPS would be subject to appraisal:

- the proposed NPS objectives set out in Section 1.10 of the draft NPS;
- the proposed assessment principles and guidance on impacts contained within Sections 4 and 5 of the draft NPS; and
- the reasonable alternatives to the draft NPS.

4.14. The 6 proposed NPS objectives have been assessed by testing their compatibility with the 13 AoS objectives. This assessment has been undertaken using a compatibility matrix (presented in **Table 5.1** of this AoS Report). The scoring system that has been used to determine their compatibility is shown in **Table 4.4**.

[61] An 2011 NDA report, 'review of environmental assessment practice in waste management organisations and UK Major infrastructure projects' identified that environmental and sustainability assessment reports had been undertaken of the Olkiluoto Repository in Finland and the Forsmark Spent Fuel repository. However, the additional information provided by the studies was considered less relevant to the AoS than the RWM reports given the location, setting and differences in assessment.

Table 4.4 Scoring system used in the compatibility assessment of draft NPS objectives

Score	Compatibility
+	Objectives are potentially compatible.
?	Uncertain if objectives are related.
~	No clear relationship between objectives.
-	Objectives are potentially incompatible.

4.15. The guidance on impacts has been assessed against the 13 AoS objectives to identify likely significant environmental and socio-economic effects using an appraisal matrix. The matrix considers, in turn, the three sub-sections used for each topic within Chapter 5 of the draft NPS: Applicant's Assessment; Decision Making (subdivided into specific areas of interest for some impacts) and Mitigation; and also identifies linkages with other parts of the draft NPS including the proposed Assessment Principles.

4.16. The performance of the draft NPS has been scored accordingly, with a commentary provided. The same matrix has been used to appraise the likely significant effects of the two reasonable alternatives to the proposed draft NPS: 'draft NPS including exclusionary criteria' and 'no NPS'. The qualitative scoring system used to assess the effects of the draft NPS and reasonable alternatives is shown in **Table 4.5** below.

Table 4.5 Scoring system used in the AoS of the draft NPS

Symbol	Likely Significant Effect on the AoS Objective
++	The draft NPS is likely to have a significant positive effect on the AoS objective.
+	The draft NPS is likely to have a positive effect on the AoS objective.
0	The draft NPS is likely to have a neutral effect on the AoS objective.
?	Effects are uncertain/there is insufficient information on which to determine effect.
-	The draft NPS is likely to have a negative effect on the AoS objective.
--	The draft NPS is likely to have a significant negative effect on the AoS objective.

4.17. A matrix has been completed for each AoS objective and is contained within the topic-based assessments in **Appendix B**. The resulting appraisal and identification of effects has been used to determine the extent to which any generic impacts identified in the draft NPS are considered sufficient and appropriate to cover the likely effects of geological disposal infrastructure, along with any proposed mitigation and enhancement measures.

Guidance on determining significance

4.18. Topic-specific guidance has been developed for what constitutes a significant effect, a minor effect or a neutral effect for each of the AoS objectives. These definitions of significance have helped ensure a consistent approach to interpreting the significance of

effects and will help the reader understand the decisions made by the appraiser. The guidance on significance can be found in the relevant topic chapters in **Appendix B** and are summarised in **Appendix A**.

Mitigation and enhancement

4.19. Identifying effective mitigation and enhancement measures is a fundamental part of the AoS. **Box 4.1** provides information on the mitigation hierarchy that has been followed in undertaking the AoS of the draft NPS. The mitigation hierarchy is based on the principle that it is preferable to prevent the generation of an impact rather than counteract its effects. It thus suggests that mitigation measures higher up the hierarchy should be considered in preference to those further down the list. The mitigation and enhancement measures proposed from the completion of the appraisal of the draft NPS are collated together in **Appendix C**.

Box 4.1 Mitigation Hierarchy

Mitigation measures should be consistent with the mitigation hierarchy[62]:

- Avoidance – making changes to a design (or potential location) to avoid adverse effects on an environmental feature. This is considered to be the most acceptable form of mitigation.
- Reduction – where avoidance is not possible, adverse effects can be reduced through sensitive environmental treatments/design.
- Compensation – where avoidance or reduction measures are not available, it may be appropriate to provide compensatory measures (e.g. an area of habitat that is unavoidably damaged may be compensated for by recreating similar habitat elsewhere). It should be noted that compensatory measures do not eliminate the original adverse effect, they merely seek to offset it with a comparable positive one.
- Remediation – where adverse effects are unavoidable, management measures can be introduced to limit their influence.
- Enhancement – where there are no negative impacts, but measures are adopted to achieve a positive move towards the sustainability objectives e.g. through innovative design.

Appraisal of secondary, cumulative and synergistic effects

4.20. The SEA Directive, and its implementing regulations in the UK, require that secondary, cumulative and synergistic effects are considered as part of the AoS (see definitions presented in **Table 4.6**).

[62] Institute of Environmental Management and Assessment (2016) Environmental Impact Assessment: Guide to Delivering Quality Development, available online at: https://www.iema.net/assets/newbuild/documents/Delivering%20Quality%20Development.pdf

Table 4.6 Definitions of secondary, cumulative and synergistic effects

Type of Effect	Definition[63]
Secondary (or indirect)	Effects that do not occur as a direct result of the draft NPS's implementation, but occur at distance from the direct impacts or as a result of a complex pathway. Examples of a secondary effect of the draft NPS would include the materials (and embodied carbon) used in the development of the geological disposal facility, or health effects of changes to air quality associated with transport.
Cumulative	Effects that occur where several individual activities which each may have an insignificant effect, combine to have a significant effect. Examples of a cumulative effect resulting from the implementation of the NPS could include the potential effects on a European designated site, where a habitat or species is vulnerable and the cumulative effects of disturbance and pollutant emissions arising from development and operation causes a significant impact. Cumulative effects will also include the potential effects (if any) of a proposed activity and any other proposed and consented developments.
Synergistic	Effects that interact to produce a total effect that is greater than the sum of the individual effects. For example, this can occur where the toxicity of two chemicals is greatly increased when they are combined.

4.21. The AoS has considered the cumulative effects of the constitute elements of the draft NPS. Additionally, the effects of the draft NPS in-combination with other plans and programmes has also be considered.

Technical difficulties

Uncertainties

4.22. The following uncertainties have been encountered during the AoS of the draft NPS:

- the proposed location of a GDF and associated deep boreholes is at present unknown and will be subject to a separate siting process;
- the timing of the delivery of a GDF and associated deep boreholes is unknown;
- the detailed design of a GDF including the full range of associated development is unknown;
- future changes to the socio-economic and environmental baseline beyond those discussed in **Appendix B** are difficult to predict, particularly over the lifetime of a GDF;
- the draft NPS will be applied on a case-by-case basis which could result in uncertainty over what provisions will be applied at the project stage; and

[63] Adapted from guidance in the Office of the Deputy Prime Minister (ODPM) (now the Department for Communities and Local Government (DCLG)) (2005) 'A Practical Guide to the Strategic Environmental Assessment Directive', available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/7657/practicalguidesea.pdf https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/7657/practicalguidesea.pdf

- decisions relating to proposals for geological disposal nationally significant infrastructure projects will need to balance adverse impacts and benefits. The net result of this balancing exercise could be uncertain, however.

Assumptions

4.23. Reflecting the uncertainties identified during the appraisal process, the following assumptions have been made:

- it is assumed that the designation of a NPS will increase marginally the probability of geological disposal infrastructure being developed and in turn increase (again marginally) the probability of associated impacts;
- it is assumed that the construction, operation and closure/decommissioning of geological disposal infrastructure will comply (where appropriate) with all relevant regulations;
- it is assumed that the environmental effects of geological disposal infrastructure proposals will be fully considered through Environmental Impact Assessment and HRA (as appropriate); and
- it is assumed that there will be no significant change to the existing planning policy and regulatory framework.

4.24. The purpose of a GDF is to isolate radioactive waste by preventing it from reaching the surface environment. The regulators will only accept the multiple safety cases for a GDF if they demonstrates that the facility meets their required high standards for protection of people and the environment. It is therefore reasonable to rely on the robustness of the regulatory regime to ensure effective operation of the facility. As such, the risk of incident outside normal operating conditions is considered unlikely and therefore the AoS considers the conditions in respect of the ordinary operation of a site.

5. Appraisal of the Sustainability effects of the draft NPS and reasonable alternatives

Introduction

5.1. This section of the AoS Report presents the findings of the appraisal of the draft NPS, which has been undertaken in accordance with the methodology described in **Section 4**. It provides a summary of the role of the AoS in the evolution of the draft NPS and an assessment of the compatibility of the draft NPS objectives with the AoS objectives. Drawing on the detailed topic-based assessments contained in **Appendix B**, it then summarises the likely significant environmental and socio-economic effects of the guidance contained in the draft NPS as well as the two reasonable alternatives ('draft NPS including exclusionary criteria' and 'no NPS'). An overview of proposed measures for enhancing the sustainability of the draft NPS is then provided before consideration is given to the significant transboundary effects of the draft NPS and secondary, cumulative and synergistic effects, in accordance with the requirements of the SEA Directive and implementing regulations.

Evolution of the draft NPS

5.2. The AoS has been undertaken alongside, and informing, the development of the draft NPS. This is to help ensure that sustainability considerations are taken into account in the development of the draft NPS. This iterative approach has sought to provide initial views on the likely significant effects of the draft NPS, proposing measures to avoid, minimise or mitigate any adverse effects and to maximise positive effects thereby enhancing its sustainability performance.

5.3. In this context, Amec Foster Wheeler undertook a review of the emerging draft NPS and provided an initial commentary on its structure and contents, identifying issues where further clarification could be helpful. The review led to a number of changes to the emerging draft NPS, including:

- development and inclusion of draft NPS objectives (see Section 1.10 of the draft NPS);
- the identification and inclusion of headline assessment principles (see Table 1, Section 4.1.9 of the draft NPS);
- inclusion of a specific topic in the impacts section concerning human health (see Section 5.9 of the draft NPS);
- inclusion of reference to equalities impact assessment (see Section 5.7.10 of the draft NPS)
- amendments to the wording of the impacts including the identification of additional mitigation measures; and

- minor structural modifications to minimise duplication.

5.4. Based on the appraisal of the draft NPS (as proposed), further measures have been identified to enhance its sustainability. This is discussed below (see 'Mitigation and Enhancement' and all mitigation measures are collated in **Appendix C**).

Compatibility assessment of the draft NPS objectives

5.5. The draft NPS sets out six objectives that provide the overarching framework for the guidance and mitigation contained in the Statement. A matrix has been completed to assess the compatibility of the draft NPS objectives against the AoS objectives. **Table 5.1** presents the results of this compatibility assessment.

5.6. Overall, the relationship between the draft NPS objectives and the AoS objectives is a positive one, reflecting the purpose of the draft NPS to provide a balanced and transparent approach to the consideration of the range of issues which need to be accounted for as part of the siting process for geological disposal infrastructure.

5.7. The assessment has identified some uncertainty between the draft NPS objective of "Implementation of government policy on geological disposal for higher activity radioactive waste and the need for such infrastructure" and the AoS objectives. This reflects the potential for the development of geological disposal infrastructure supported by Government policy to have some adverse effects, particularly during the construction phase, although once operational, a GDF will ensure the isolation of radioactive waste from people and the environment generating positive effects across the AoS objectives.

5.8. Further uncertainty has been identified in respect of the draft NPS objective of providing a "planning process that enables infrastructure to be developed which will provide a long-term, secure, safe and sustainable solution to the disposal of higher activity radioactive waste". This is likely to be where interpretation and judgement will need to be exercised by the Examining Authority and Secretary of State in respect of the balancing of likely significant effects, impacts and benefits. Uncertainty also arises due to the likely duration of the lifecycle of the GDF and the limitations such a timeframe has on the availability of forecast data (for example, in respect of climate change current climate models extend out to 2080, compared to the 150 year time horizon for GDF construction and waste emplacement). These uncertainties do not mean that incompatibility might necessarily arise, merely that the decision making process could be more complex for some topics.

5.9. No incompatibilities between the draft NPS objectives and the AoS objectives have been identified. However, it is important to note that whilst these relationships are positive in principle, the specific circumstances of implementation (for example, the characteristics of sites taken forward for development) could change these relationships in the light of the balancing exercise which may be required to achieve the objectives of the NPS and securing environmental, social and economic interests.

Table 5.1 Compatibility assessment

Draft NPS Objective	AoS Objective												
	1. Biodiversity	2. Population	3. Human Health	4. Land Use	5. Water	6. Flood Risk and Coastal Change	7. Air	8. Noise	9. Climatic Factors	10. Waste and Resources	11. Traffic and Transport	12. Cultural Heritage	13. Landscape and Townscape
Implementation of government policy on geological disposal for higher activity radioactive waste and the need for such infrastructure.	+/?	+/?	+/?	+/?	+/?	+/?	+/?	+/?	+/?	+/?	+/?	+/?	+/?
To establish a clear and transparent planning process to guide the preparation and development of nationally significant infrastructure projects relating to the geological disposal of higher activity radioactive waste in England.	+	+	+	+	+	+	+	+	+	+	+	+	+
To provide a planning process that enables infrastructure to be developed which will provide a long-term, secure, safe and sustainable solution to the disposal of higher activity radioactive waste.	+/?	+/?	+/?	+/?	+/?	+/?	+/?	+/?	+/?	+/?	+/?	+/?	+/?
To provide guidance to nationally significant infrastructure developers on the relevant infrastructure, generic impacts and general siting considerations that may be needed to be taken into account when planning for the development of geological disposal infrastructure.	+	+	+	+	+	+	+	+	+	+	+	+	+
To provide the primary basis for examination by the Examining Authority and for decisions by the Secretary of State, on development consent applications for geological disposal infrastructure.	+	+	+	+	+	+	+	+	+	+	+	+	+
To provide policy and guidance on generic impacts to support any relevant local planning authorities in preparing their local impact reports, which they will be invited to prepare under Section 60 of the Planning Act.	+	+	+	+	+	+	+	+	+	+	+	+	+

Key

+	Objectives are potentially compatible.	?	Uncertain if objectives are related.	~	No clear relationship between objectives.	-	Objectives are potentially incompatible.

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The likely significant sustainability effects of the draft NPS and the reasonable alternatives

5.10. The draft NPS, and in particular the guidance on impacts contained in Chapter 5 of the draft NPS, have been assessed against the 13 AoS objectives to identify likely significant environmental and socio-economic effects. This assessment is contained within each of the topic-based assessments in **Appendix B**.

5.11. The following sub-sections summarise the anticipated effects of the implementation of the draft NPS and present them by AoS objective topic. The qualitative scoring system used in the summary tables is shown in **Table 5.2** below.

Table 5.2 Scoring system used in the AoS of the draft NPS

Symbol	Likely Significant Effect on the AoS Objective
++	The draft NPS is likely to have a significant positive effect on the AoS objective.
+	The draft NPS is likely to have a positive effect on the AoS objective.
0	The draft NPS is likely to have a neutral effect on the AoS objective.
?	Effects are uncertain/there is insufficient information on which to determine effect.
-	The draft NPS is likely to have a negative effect on the AoS objective.
--	The draft NPS is likely to have a significant negative effect on the AoS objective.

5.12. The performance of the two reasonable alternatives to the proposed draft NPS ('draft NPS including exclusionary criteria' and 'no NPS') is also considered. It should be noted, however, that the 'no NPS' reasonable alternative is not the same as a 'baseline or business as usual' scenario. Under the 'no NPS' reasonable alternative, proposals for geological disposal infrastructure could still be brought forward, consistent with the Council Directive 2011/70/Euratom and the 2014 White Paper, and planning decisions would be made in the context of the prevailing national planning policy and legislation.

Biodiversity and nature conservation

5.13. The construction, operation and decommissioning/closure of geological disposal infrastructure could have a wide range of impacts on biodiversity, including:

- effects on designated/protected sites and species, both directly and indirectly;
- direct or indirect loss or fragmentation of habitat;
- disturbance/displacement of wildlife as a result of noise, human presence, traffic and light pollution;
- effects on biodiversity through accidental pollution incidents, contaminated run-off from surface drainage or transport-related pollution;
- effects on aquatic habitats and wildlife from discharges of drainage of underground workings; and

- effects on aquatic habitats and aquatic wildlife species if dewatering of underground excavations affects water levels in surface water bodies and wetlands.

5.14. Ecological impacts would primarily relate to the development of surface facilities. This reflects the fact that the underground elements of a GDF would be at depths of between 200 metres and 1,000 metres such that development would be unlikely to have any direct impact on, for example, habitats and water resources which support biodiversity or affect people's enjoyment of the natural environment. Similarly, vibration effects from the use of explosives for underground construction would not be expected to have a significant impact at the surface due to the distances involved and the requirements to minimise potential damage to the rock in which a GDF is constructed.

5.15. **Table 5.3** presents the findings of the appraisal of the draft NPS and the reasonable alternatives on biodiversity and nature conservation (AoS Objective 1) in the context of the possible impacts identified above. Effects have been identified for the draft NPS topic sub-sections (Applicant's Assessment, Decision Making and Mitigation) as well as for the draft NPS as a whole (cumulative effects).

Table 5.3 Appraisal of the draft NPS and reasonable alternatives: biodiversity and nature conservation

Biodiversity and Nature Conservation	Applicant's Assessment	Decision Making	Mitigation	Cumulative Effects
Draft NPS	**+**	**+**	**+/?**	**+**
Draft NPS including Exclusionary Criteria	**++/?**	**++/?**	**+/?**	**++**
No NPS	**+/?**	**+/?**	**+/?**	**+/?**

Draft NPS

5.16. The draft NPS sets out how the interests of protected areas/sites (international, national and local) should be considered by the Secretary of State which is expected to have a positive effect on biodiversity and nature conservation. A general principle is established that development should avoid significant harm to biodiversity and geological conservation interests, including through mitigation, the consideration of reasonable alternatives, biodiversity offsetting and compensation. At paragraph 5.4.7 it states that "In taking decisions, the Secretary of State should ensure that appropriate weight is attached to designated sites of international, national and local importance, protected species and habitats and other species of principal importance for the conservation of biodiversity, and to biodiversity and geological interests within the wider environment". At paragraph 5.4.9, the draft NPS also notes that "The Secretary of State must comply with the 'Habitats Regulations' when considering development, where that development is likely to have a significant effect on a European site".

5.17. The Habitats Regulations requirements and the requirement for the preparation of an Environmental Statement (ES) will ensure that the likely effects on biodiversity and nature conservation are comprehensively assessed. Where biodiversity interests are affected, the draft NPS provides for the application of mitigation measures, addressing direct and indirect effects, which should result in positive effects on this AoS objective. However, the AoS has identified that these measures could be more specific in their detail, addressing effects at key project stages. This is discussed further below (see 'Mitigation and Enhancement' and all mitigation measures are collated in **Appendix C**).

5.18. There are also strong linkages between biodiversity and nature conservation and other topics contained in Chapter 5 of the draft NPS including, in particular, those topics related to air quality, noise, flood risk and coastal change, landscape and visual impacts, land use and water quality. Taken together, it is anticipated that this will generate further positive effects in respect of this AoS objective.

5.19. Overall, the draft NPS has been assessed as having a positive effect on AoS Objective 1, reflecting the role of the draft NPS in providing a clear framework to guide decision making on geological disposal infrastructure and complementing existing planning policy and wider legislation protecting biodiversity and nature conservation interests.

Draft NPS including exclusionary criteria

5.20. Positive effects on AoS Objective 1 associated with this reasonable alternative are expected to be similar to those identified in respect of the draft NPS above, although the magnitude of effect will be greater. This reflects the expectation that the exclusion of siting of geological disposal infrastructure within internationally designated nature conservation sites will help to avoid/lessen adverse impacts on these assets, providing greater certainty with respect to the location of development.

5.21. However, simply excluding works from within a designated conservation area would not necessarily exclude the possibility of adverse effects occurring (although the general risk of adverse effects is assumed to be reduced). Adverse effects could arise if the development were sited adjacent or close to the boundary of the designated conservation area, or if the reasons for the designation included mobile species (such as bats or migratory birds) who used extended areas for foraging or breeding. In addition, unintended effects could be produced as a consequence, such as greater development pressure on areas peripheral to excluded areas and/or local assets not given specific protection, although this is currently uncertain (as reflected in the scoring contained in **Table 5.3**). In such instances, a range of mitigation measures addressing direct and indirect effects (similar to those specified in the draft NPS) may then be appropriate.

5.22. In any case, existing national planning policy, legislation and the environmental permitting regime, together with the requirements of the draft NPS (as proposed), provide for the protection of designated nature conservation sites such that it can be reasonably expected that the potential for adverse impacts in this regard would be fully considered at the project stage. Even where there is the potential for adverse impacts to arise as a result of the development of geological disposal infrastructure, in many cases it is likely that these impacts could be avoided, minimised or mitigated through, for example, design measures (and in accordance with the provision of the draft NPS).

5.23. Taking into account the effects of mitigation, and the reduced risks of adverse effects, overall, this alternative has been assessed as having a significant positive effect on AoS Objective 1.

No NPS

5.24. Under this alternative, international and national legislation and national and local planning policy protecting habitats and species would apply. The Environmental Impact Assessment Regulations would also require the consideration of impacts associated with the development of geological disposal infrastructure on biodiversity to be assessed whilst the Secretary of State must comply with the Habitats Regulations where development is likely to have a significant effect on a European designated nature conservation site. Taken together, this would be expected to help ensure that impacts on biodiversity assets are identified, assessed and, where appropriate, mitigated. However, the absence of clear expectations concerning design and planning obligations specific to geological disposal infrastructure could lead to uncertainty and inconsistency in the application of this policy and regulatory framework and missed opportunities for habitat creation and biodiversity enhancement.

5.25. Overall, this alternative has been assessed as having a positive effect on AoS Objective 1, although a degree of uncertainty persists.

Population, economics and skills

5.26. The fluctuating influx of workers during construction, operation and decommissioning/closure of geological disposal infrastructure may result in changes to local population dynamics. This could alter the demand for services and facilities in the settlements nearest to construction sites, potentially stimulate investment in services and facilities and affect social cohesion. The construction and operation of geological disposal infrastructure will have positive economic impacts such as job creation, spend in the local economy and investment in the supply chain and could generate opportunities for investment in local skills and education. However, development may also result in a modest reduction in property values within a few kilometres of a proposed site (although a positive impact on property values in the longer term is considered likely once a facility is constructed and operating, driven by skilled workers and an increased demand for local housing). Construction works may adversely affect local visitor economies (depending on site location, changes in perception and possible interest features).

5.27. Notwithstanding the socio-economic impacts identified above, it is important to note that the number of workers required at any one time during the construction and operational phases of a GDF would be relatively small. This reflects the length of these phases, which would be approximately 150 years in duration. In consequence, any socio-economic impacts associated with a GDF whilst of sustained duration would likely be limited.

5.28. **Table 5.4** presents the findings of the appraisal of the draft NPS and the reasonable alternatives on population, economics and skills (AoS Objective 2) in the context of the possible impacts identified above. Effects have been identified for the draft NPS topic sub-sections (Applicant's Assessment, Decision Making and Mitigation) as well as for the draft NPS as a whole (cumulative effects).

Table 5.4 Appraisal of the draft NPS and reasonable alternatives: population, economics and skills

Population, Economics and Skills	Applicant's Assessment	Decision Making	Mitigation	Cumulative Effects
Draft NPS	+	+	+/?	+
Draft NPS including Exclusionary Criteria	+/?	+	+/?	+/?
No NPS	+/?	+/?	+/?	+/?

Draft NPS

5.29. The draft NPS identifies a broad range of potential social and economic impacts that may be associated with the development of geological disposal infrastructure and which should be considered by applicants. These impacts include:

- the creation of jobs and training opportunities;
- the provision of educational and visitor facilities;
- impacts on equalities groups;
- effects on tourism;
- the impact on local services; and
- the need for accommodation for workers.

5.30. At paragraphs 5.7.13 to 5.7.14, meanwhile, the draft NPS stipulates that "The Secretary of State should have regard to the potential socio-economic impacts of new geological disposal infrastructure identified by the applicant" and "consider any relevant positive provisions the applicant has made or is proposing to make to mitigate impacts (for example through planning obligations) and any community investment that may arise as well as any options for phasing development in relation to the socio-economic impacts".

5.31. This guidance is expected to help ensure that adverse socio-economic impacts associated with the development of geological disposal infrastructure are identified, assessed and, where appropriate mitigated, and that opportunities to maximise positive impacts (such as jobs creation and investment in skills) are realised.

5.32. Notwithstanding the positive effects outlined above, it is considered that further guidance could be provided in the draft NPS in respect of specific mitigation and enhancement measures during the project-lifecycle of a GDF. This is discussed further below (see 'Mitigation and Enhancement' and all mitigation measures are collated in **Appendix C**).

5.33. Overall, the draft NPS has been assessed as having a positive effect on AoS Objective 2.

Draft NPS including exclusionary criteria

5.34. Positive effects on AoS Objective 2 associated with this reasonable alternative are expected to be broadly similar to those identified in respect of the draft NPS above. The exclusion of specific environmental and cultural assets may indirectly help to avoid adverse impacts arising from the construction and operation of geological disposal infrastructure on the visitor economy as such assets can often be important tourist attractions. However, the result would be to displace adverse impacts, possibly to an area that is not designated but even more reliant on tourism and therefore more sensitive to change. Further, the exclusion of areas could reduce the scope of community engagement and unnecessarily exclude communities in these areas from the potential socio-economic benefits of hosting a GDF. In consequence, whilst the effects of this alternative on AoS Objective 2 are likely to be positive, a degree of uncertainty remains.

No NPS

5.35. Under this alternative, applications would be subject to the provisions of national and local planning policy and the Environmental Impact Assessment Regulations and which together would support the identification, assessment and mitigation/enhancement of socio-economic impacts arising from the development of geological disposal infrastructure. However, the absence of clear expectations relating to design (including mitigation and enhancement) and planning obligations in the context of geological disposal infrastructure could lead to uncertainty and inconsistency in interpretation and missed opportunities to deliver social and economic benefits.

5.36. Overall, this alternative has been assessed as having a positive effect on AoS Objective 2, although a degree of uncertainty persists.

Human health

5.37. The construction, operation and decommissioning/closure of geological disposal infrastructure could have a wide range of potential impacts on human health. Adverse impacts could include, for example, emissions to air and dust from vehicle movements and construction activity which could affect sensitive receptors (for example, those with respiratory illnesses living adjacent to principal traffic routes) and anxiety and stress due to concerns regarding the safety of geological disposal. Development may also affect access to open space and recreational facilities (for example, as a result of loss of facilities/access due to development) whilst an influx of construction workers could increase pressure on local healthcare facilities. However, there is the potential for development to generate positive health impacts such as investment in healthcare facilities and open space or the implementation of measures to improve transport infrastructure which encourage active travel.

5.38. Health impacts would primarily relate to the development of surface facilities. This reflects the fact that the underground elements of a GDF would be at depths of between 200 metres and 1,000 metres underground such that development would be unlikely to have any direct impact on communities. There could be vibration effects from the use of explosives for underground construction. However, this would not be expected to have a significant impact at the surface due to the distances involved and the requirements to minimise potential damage to the rock in which a GDF is constructed.

5.39. **Table 5.5** presents the findings of the appraisal of the draft NPS and the reasonable alternatives on human health (AoS Objective 3) in the context of the possible impacts

identified above. Effects have been identified for the draft NPS topic sub-sections (Applicant's Assessment, Decision Making and Mitigation) as well as for the draft NPS as a whole (cumulative effects).

Table 5.5 Appraisal of the draft NPS and reasonable alternatives: human health

Human Health	Applicant's Assessment	Decision Making	Mitigation	Cumulative Effects
Draft NPS	+	+	0	+
Draft NPS including Exclusionary Criteria	+	+	0	+
No NPS	+/?	+/?	?	+/?

Draft NPS

5.40. The inclusion of health as a standalone topic in Chapter 5 of the draft NPS, and the requirement at paragraph 5.9.4 that applicants should assess (in liaison with the relevant local authority and Clinical Commissioning Group) impacts on human health as part of an ES (if required), serve to highlight human health as a material consideration in the determination of geological disposal nationally significant infrastructure project applications. It is also noted that at paragraph 5.9.9, the draft NPS states that the Secretary of State "should also consider the positive effect of employment and other socio-economic impacts…on human health and well-being". This is expected to help ensure that consideration is given to the broader determinants of health which extend beyond those covered by other regulatory regimes relating to health and safety and pollution control.

5.41. It is important to note that other topics in Chapter 5 of the draft NPS relate to human health including, in particular, noise, air quality and water quality. Health is also identified as one of the five assessment principles contained in Table 1 (Section 4.1) of the draft NPS. Taken together, it is anticipated that this will generate further positive effects in respect of this AoS objective.

5.42. The appraisal contained in **Appendix B** has identified that the mitigation referred to in the draft NPS could acknowledge the relevance of wider determinants of health (both mental and physical) and be more specific to, and clearly reflect, the potential effects associated with the key project stages of site investigation, construction, operation and closure. This is discussed further below (see 'Mitigation and Enhancement' and all mitigation measures are collated in **Appendix C**).

5.43. It should also be noted that potential radiological impacts on the health of workers and the public associated with a GDF would be regulated by the Office for Nuclear Regulation and the Environment Agency. The Basic Safety Standards Directive (96/29/Euratom) and the Ionising Radiations Regulations 1999/3232 (and associated legislation) lay down basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionising radiation. Some geological disposal infrastructure may also be subject to the Control of Major Accident Hazards Regulations 2015 (the COMAH Regulations). These regulations aim to prevent major accidents involving dangerous substances and limit the consequences for people and the environment of any that do occur. Radiological impacts are therefore separate from the planning process. However, by helping to ensure that long-term provision is made for the management of waste in the inventory for disposal, the draft

NPS will indirectly minimise any risks or consequences arising from the current interim storage of higher activity radioactive waste and which could impact on human health.

5.44. Overall, the draft NPS is considered to provide a strong framework to guide decisions on geological disposal infrastructure in respect of human health and has therefore been assessed as having a positive effect on AoS Objective 3.

Draft NPS including exclusionary criteria

5.45. Positive effects on AoS Objective 3 associated with this reasonable alternative are expected to be broadly similar to those identified in respect of the draft NPS above. As designated nature conservation sites and cultural heritage assets can play an important recreational and leisure role (thereby supporting healthy lifestyles), there could be indirect health benefits associated with the adoption of criteria that excludes such assets. However, this would simply mean that such effects were displaced elsewhere, possibly to an area that is not designated but nevertheless important as a leisure and recreational resource or to a locality that may give rise to more significant adverse impacts on human health (for example, locations where there is a higher concentration of receptors with pre-existing health issues).

No NPS

5.46. There is a range of legislation and regulatory controls that will help to ensure that adverse impacts on human health associated with the construction, operation and decommissioning/closure of geological disposal infrastructure are identified, assessed and minimised/mitigated to an acceptable level. These include, for example, regulation under the Health and Safety at Work etc. Act 1974 and the Environmental Protection Act 1990. Further, amendments to the Environmental Impact Assessment Directive are expected to help ensure that due consideration is given to human health as part of the Environmental Impact Assessment process. In the absence of a NPS, positive effects on this AoS objective would therefore be expected. However, without a clear statement regarding the full range of considerations to be taken into account by the applicant and Secretary of State (as proposed in the draft NPS) there may be inconsistency in the interpretation of existing legislation and policy, particularly at a project level whilst opportunities to enhance human health could be missed.

5.47. Whilst proposals for geological disposal infrastructure would still be consistent with Council Directive 2011/70/Euratom (which broadly accepts that deep geological disposal represents the safest and most sustainable option as the end point of the management of high level waste) and would still be determined as a nationally significant infrastructure project in accordance with the Planning Act 2008, without a NPS there would be increased uncertainty in respect of the delivery of a GDF.

5.48. Overall, this alternative has been assessed as having a positive effect on AoS Objective 3, although a degree of uncertainty persists.

Land use, geology and soils

5.49. The construction and operation of geological disposal infrastructure could affect existing land uses due to land take associated with new development. There may also be indirect impacts on surrounding land uses due to, for example, severance or disturbance. With regard to soils, the temporary removal of topsoil and subsoil, low level contamination and disturbance/remobilisation of existing contaminants could affect land quality. Effects on geology, meanwhile, could be direct where development affects recognised important geological sites, such as Sites of Special Scientific Interest

(SSSIs) or Regionally Important Geological Sites (RIGS), or indirect where development inhibits the exploitation and production of natural resources within or in proximity to the infrastructure.

5.50. Impacts on land use and soils would be predominantly associated with the development of surface facilities. At depths of between 200 metres and 1,000 metres, the underground elements of a GDF would be unlikely to affect land use patterns or soils.

5.51. **Table 5.6** presents the findings of the appraisal of the draft NPS and the reasonable alternatives on land use, geology and soils (AoS Objective 4) in the context of the possible impacts identified above. Effects have been identified for the draft NPS topic sub-sections (Applicant's Assessment, Decision Making and Mitigation) as well as for the draft NPS as a whole (cumulative effects).

Table 5.6 Appraisal of the draft NPS and reasonable alternatives: land use, geology and soils

Land Use, Geology and Soils	Applicant's Assessment	Decision Making	Mitigation	Cumulative Effects
Draft NPS	**+/?**	**+/?**	**+/?**	**+/?**
Draft NPS including Exclusionary Criteria	**+/?**	**+/?**	**+/?**	**+/?**
No NPS	**+/?**	**+/?**	**+/?**	**+/?**

Draft NPS

5.52. Reflecting existing national planning policy contained in the National Planning Policy Framework (NPPF) and the potential range of impacts outlined above, the draft NPS requires applicants to assess, and the Secretary of State to consider, a range of impacts on land use, geology and soils, including in respect of:

- existing and proposed land uses;
- the Green Belt;
- open space, sports and recreation facilities;
- best and most versatile agricultural land;
- soil quality; and
- mineral or hydrocarbon resources.

5.53. In view of the range of impacts identified, the draft NPS is considered to make a positive contribution to this AoS objective (although further consideration could be given to impacts in respect of geological stability and marine activities). Further, by helping to ensure that long-term provision is made for the management of waste in the inventory for disposal, land currently associated with the storage of intermediate level waste will be released for reuse and in consequence, there may be indirect beneficial effects in respect of land use.

5.54. Potential measures to mitigate adverse impacts on land use are identified at paragraphs 5.11.21 to 5.11.25 of the draft NPS. These measures include the adoption of good design to minimise impacts on existing land uses, the reuse of sterilised land and ensuring connectivity of the green infrastructure network. However, the detailed

assessment contained in **Appendix B** highlights an absence of reference to soils and geology in this context as well as the marine environment.

5.55. There are important links between land use, geology and soils and other topics contained in Chapter 5 of the draft NPS including, in particular, those topics related to biodiversity and nature conservation, flood risk and coastal change. The assessment principles set out in Chapter 4 may also help to ensure that measures are adopted such as good design to avoid adverse impacts on existing land uses and promote the sustainable use of raw materials including soils and minerals. This is expected to generate further positive effects in respect of this AoS objective.

5.56. Overall, the draft NPS has been assessed as having a positive effect on AoS Objective 4 although some uncertainty remains as the draft NPS does not prevent development that would have adverse effects on, for example, the best and most versatile agricultural land or geological sites.

Draft NPS including exclusionary criteria

5.57. The exclusionary criteria as currently proposed do not exclude areas on the basis of soil, land use or geology. However, excluding areas based on landscape, heritage and nature conservation designations may have some indirect benefits for some soil types, such as upland peat areas (although this would be limited). In consequence, the performance of this alternative is not considered to be materially different from the draft NPS and so will have the same potential benefits and uncertainties.

No NPS

5.58. Under this alternative, applications for development consent would be subject to the provisions of nationally planning policy and the Environmental Impact Assessment Regulations which would require the consideration of effects on land use, geology and soils. Further, the requirement for environmental permits under the Environmental Permitting (England and Wales) Regulations 2016 and requirements associated with, for example, the Contaminated Land (England) Regulations 2006 would be expected to help ensure that any adverse effects on land use, geology and soils associated with the development of a GDF or deep investigative boreholes are acceptable. In the absence of a NPS, effects on AoS Objective 4 would therefore still be considered to be positive. However, without a clear statement concerning the full range of considerations to be taken into account by the applicant and Secretary of State (as proposed in the draft NPS), there may be inconsistency in the interpretation of existing legislation and policy, particularly at a project level.

5.59. Overall, this alternative has been assessed as having a positive effect on AoS Objective 4, although a degree of uncertainty persists.

Water quality (including surface and ground water quality and availability)

5.60. The development of geological disposal infrastructure is likely to require substantial volumes of water, particularly during the construction phase. The siting, construction, operation and closure of a GDF and associated development may also have adverse effects on local water quality due to, for example, an increase in surface water runoff, or any abstractions or discharges. These impacts would be principally related to the development of surface facilities; construction below the surface strata of rock would not be expected to affect surface waters or groundwater due to the depth and hydrogeological isolation of the underground elements of a GDF.

5.61. **Table 5.7** presents the findings of the appraisal of the draft NPS and the reasonable alternatives on water quality (AoS Objective 5) in the context of the possible impacts identified above. Effects have been identified for the draft NPS topic sub-sections (Applicant's Assessment, Decision Making and Mitigation) as well as for the draft NPS as a whole (cumulative effects).

Table 5.7 Appraisal of the draft NPS and reasonable alternatives: water quality

Water Quality	Applicant's Assessment	Decision Making	Mitigation	Cumulative Effects
Draft NPS	+	+	+/?	+
Draft NPS including Exclusionary Criteria	+	+	+/?	+
No NPS	+/?	+/?	+/?	+/?

Draft NPS

5.62. The draft NPS requires (in liaison with key regulators and other bodies with an interest in the water environment) that potential impacts on water quality and resources are identified, assessed and, where necessary, mitigated and that "The Secretary of State should be satisfied that a proposal has had regard to the River Basin Management Plans and the requirements of the Water Framework Directive (including Article 4.7) and its daughter directives, including those on priority substances and groundwater. The specific objectives for particular river basins are set out in River Basin Management Plans" (paragraph 5.14.11). This is expected to help minimise water requirements and waste water production and protect surface, groundwater, estuarine and coastal water quality.

5.63. It should be noted that there are also links between water quality and resources and other topics contained in Chapter 5 of the draft NPS including, in particular, those topics related to biodiversity and nature conservation, climatic factors and flood risk and coastal change. The requirement for applicants to include design as an integral consideration from the outset of a proposal in Section 4.5 of the draft NPS may also help to ensure that measures are adopted to minimise the use of water and mitigate adverse impacts on water quality (for example, by reducing surface water runoff). Taken together, it is anticipated that this will generate further positive effects in respect of this AoS objective.

5.64. Whilst the guidance contained in the draft NPS is expected to help ensure that adverse effects arising from geological disposal infrastructure development are minimised, it is considered that (as currently worded) the draft NPS lacks specificity in terms of the suite of measures that could be implemented to address effects at key project stages. This is discussed further below (see 'Mitigation and Enhancement' and all mitigation measures are collated in **Appendix C**).

5.65. Overall, the draft NPS is considered to provide a clear framework to guide decisions on geological disposal infrastructure in respect of the water environment. It complements existing national planning policy and legislation as well as the objectives of River Basin Management Plans (RBMPs) in respect of the Water Framework Directive (2000/60/EC). In consequence, the draft NPS has been assessed as having a positive effect on AoS Objective 5.

Draft NPS including exclusionary criteria

5.66. Positive effects on AoS Objective 5 associated with this reasonable alternative are expected to be broadly similar to those identified in respect of the draft NPS above. The appraisal has identified that the setting of clear parameters for siting which excludes specific environmental and cultural assets may indirectly help to avoid adverse impacts on water quality and resources in localities where they support water-dependent nature conservation sites (SACs, SPAs, Ramsar sites), although this is not considered to constitute a significant positive effect in the context of this AoS objective.

No NPS

5.67. Under this alternative, applications would be subject to the provisions of national planning policy and the Environmental Impact Assessment Regulations. Environmental permits for the discharge of contaminated water and abstraction licences where water is supplied from surface water or groundwater bodies may also be required alongside a Marine Licence for works affecting marine areas. This is expected to help ensure that water quality and resources are not compromised by geological disposal infrastructure generating a positive effect on this AoS objective. However, the absence of a clear statement regarding the full range of considerations to be taken into account by the applicant and Secretary of State (as proposed in the draft NPS) risks inconsistency in interpretation, particularly at a project level.

5.68. Overall, this alternative has been assessed as having a positive effect on AoS Objective 5, although a degree of uncertainty persists.

Flood risk and coastal change

5.69. Geological disposal infrastructure and particularly surface facilities could be affected by flooding and coastal change, particularly if inappropriately sited. Development at the surface may also increase flood risk due to, for example, an increase in surface water runoff associated with impermeable areas of development and the siltation of local water courses. These impacts could be accentuated over the lifetime of a GDF due to the effects of climate change.

5.70. **Table 5.8** presents the findings of the appraisal of the draft NPS and the reasonable alternatives on flood risk and coastal change (AoS Objective 6) in the context of the possible impacts identified above. Effects have been identified for the draft NPS topic sub-sections (Applicant's Assessment, Decision Making and Mitigation) as well as for the draft NPS as a whole (cumulative effects).

Table 5.8 Appraisal of the draft NPS and reasonable alternatives: flood risk and coastal change

Flood Risk and Coastal Change	Applicant's Assessment	Decision Making	Mitigation	Cumulative Effects
Draft NPS	+	+	+/?	+
Draft NPS including Exclusionary Criteria	+/?	+	+/?	+
No NPS	+/?	+/?	+/?	+/?

Draft NPS

5.71. Reflecting national planning policy contained in the NPPF, the draft NPS requires that applications for development consent are supported by a Flood Risk Assessment (FRA) (where appropriate) and that the sequential test set out in the NPPF is adopted when assessing flood risk. At paragraph 5.8.28, it stipulates that the Secretary of State should not consent development in Flood Zones 2 and 3 unless satisfied that the Sequential and Exceptions Tests requirements have been met. It also gives priority to appropriate mitigation including the use of sustainable drainage systems (SuDS) and to flood resilience. In consequence, the draft NPS is expected to help ensure that full and appropriate consideration is given to flood risk in siting and consenting decisions and that appropriate mitigation is implemented as appropriate.

5.72. With specific regard to coastal change, the draft NPS sets out that for proposals located in a Coastal Change Management Area, applicants should provide appropriate justification in terms of why there is a need for development to be located in a Coastal Change Management Area and assess the vulnerability of the proposed development to coastal change. At paragraph 5.8.29, meanwhile, the draft NPS states that the Secretary of State "should not grant development consent unless it is demonstrated that: the development will be safe over its planned operational lifetime and will not have an unacceptable impact on coastal change; the character of the coast (including designations) is not compromised; the development provides wider sustainability benefits; and the development does not hinder the creation and maintenance of a continuous, signed and managed route around the coast". It is considered that this guidance should help to avoid inappropriate development in areas affected by coastal erosion.

5.73. Overall, the draft NPS attaches substantial weight to the risks of flooding and coastal change. The guidance contained in Chapter 5 alongside other requirements relating to, for example, good design and climate change adaptation, will help to minimise direct and indirect effects with respect to any potential flood risk and coastal change. The draft NPS has therefore been assessed as having a positive effect on this AoS objective.

Draft NPS including exclusionary criteria

5.74. Positive effects on AoS Objective 6 associated with this reasonable alternative are expected to be broadly similar to those identified in respect of the draft NPS above. The setting of clear parameters for siting which excludes specific landscape, cultural and natural heritage assets is considered likely to yield further positive effects as the exclusionary criteria would help to ensure that any residual (post mitigation) flood risk and coastal change impacts associated with geological disposal infrastructure do not have adverse effects on these key assets. Unintended effects could be produced as a consequence, such as increased development pressure within areas of flood risk. However, given existing national planning policy and the provisions of the draft NPS this would be unlikely, although some uncertainty in this regard remains (as reflected in the scoring in **Table 5.8**).

No NPS

5.75. Despite the absence of a guiding framework relating to flood risk and coastal change in the context of geological disposal infrastructure, under this alternative, development would continue to be subject to the provisions of national planning policy and the Environmental Impact Assessment Regulations. Together with local planning policy

(including that contained in Marine Plans) and other plans and strategies (such as local flood risk management plans), this framework would help to guide development and ensure that geological disposal infrastructure is appropriately sited and designed to avoid significant negative impacts in respect of flood risk and coastal change.

5.76. Notwithstanding the benefits outlined above, the absence of a clear statement on the role of the Secretary of State in assessing the location of development in particular risks uncertainty. It is acknowledged that whilst mitigation measures would be forthcoming under this alternative, there is also a risk that these would not be as comprehensive or consistent and may not fully address any effects arising.

5.77. Overall, this alternative has been assessed as having a positive effect on AoS Objective 6, although a degree of uncertainty persists.

Air

5.78. The development of geological disposal infrastructure will result in non-radioactive emissions to air that could lead to adverse impacts on human health as well as biodiversity and soils. Sources of potential emissions to air include vehicle movements, construction plant, generators and dust generated during construction.

5.79. **Table 5.9** presents the findings of the appraisal of the draft NPS and the reasonable alternatives on air (AoS Objective 7) in the context of the possible impacts identified above. Effects have been identified for the draft NPS topic sub-sections (Applicant's Assessment, Decision Making and Mitigation) as well as for the draft NPS as a whole (cumulative effects).

Table 5.9 Appraisal of the draft NPS and reasonable alternatives: air

Air	Applicant's Assessment	Decision Making	Mitigation	Cumulative Effects
Draft NPS	+	+	+/?	+
Draft NPS including Exclusionary Criteria	+	++	+/?	++
No NPS	+/?	+/?	+/?	+/?

Draft NPS

5.80. Air quality standards and objectives are governed by European and domestic legislation. Where impacts of a project are expected to affect the UK's ability to meet the targets laid out in this legislation, or result in significant negative effects on air quality in accordance with the Environmental Impact Assessment Regulations, the draft NPS sets out that the applicant must undertake an assessment of the impacts as part of an ES. The draft NPS also requires that the Secretary of State gives substantial weight to air quality issues and at paragraph 5.2.12 states that consent can be refused where there are significant impacts on air quality which would contravene the Air Quality Directive (2008/50/EC).

5.81. It is important to note that there are also links between air quality and other topics contained in Chapter 5 of the draft NPS including, in particular, those topics related to biodiversity and nature conservation, human health and traffic and transport. In addition, the assessment principles (including in respect of good design, common law and nuisance, pollution control and other regulatory regimes) may also help to ensure

that measures are adopted to avoid adverse impacts on air quality. This is expected to generate further positive effects in respect of this AoS objective.

5.82. Whilst the guidance contained in the draft NPS is expected to help ensure that adverse effects arising from geological disposal infrastructure on air quality are minimised, it is considered that the mitigation measures identified at paragraphs 5.2.14 to 5.2.17 could be revised to be more specific and clearly reflect the potential effects associated with the key project stages of geological disposal infrastructure. This is discussed further below (see 'Mitigation and Enhancement' and all mitigation measures are collated in **Appendix C**).

5.83. Overall, it is considered that the draft NPS provides a strong policy framework to ensure that significant adverse impacts on air quality arising from the development of geological disposal infrastructure are avoided/mitigated. It has therefore been assessed as having a positive effect on AoS Objective 7.

Draft NPS including exclusionary criteria

5.84. Positive effects on AoS Objective 7 associated with this reasonable alternative are expected to be broadly similar to those identified in respect of the draft NPS above. However, the magnitude of positive effects would be potentially greater.

5.85. Setting clear criteria for siting which specifically excludes landscape, cultural and natural heritage assets including Natura 2000 sites would help to avoid adverse impacts on air quality within these areas and help to establish clearer parameters for decision making. Whilst unintended effects could be produced as a consequence, such as greater development pressure on areas not afforded protection and which may have existing air quality issues, given existing policy and legislation on air quality and the requirements of the draft NPS, this would be unlikely.

5.86. Overall, this alternative has been assessed as having a significant positive effect on AoS Objective 7.

No NPS

5.87. Existing national planning policy, the Environmental Impact Assessment Regulations and statutory air quality thresholds set out in the Air Quality Standards Regulations 2010 and the Air Quality Directive together with the environmental permitting regime would help to ensure that the construction, operation and closure/decommissioning of geological disposal infrastructure does not have significant adverse impacts on air quality. This position would be maintained without a NPS. In consequence, this alternative has been assessed as having a positive effect on this AoS objective. However, the absence of a clear statement on the full range of considerations to be taken into account by applicants and the Secretary of State risks inconsistency in the interpretation of this existing framework and unintended consequences through implementation.

5.88. Overall, this alternative has been assessed as having a positive effect on AoS Objective 7, although a degree of uncertainty persists.

Noise

5.89. The development of geological disposal infrastructure will generate noise which could lead to adverse impacts on sensitive receptors such as residential properties and habitats and species in close proximity to development sites and along transport corridors. Sources of potential noise could include the operation of generators and

drilling activities, construction vehicle movements and the handling of materials and waste.

5.90. Noise impacts would be principally associated with the development of surface facilities. As noted above, there could be vibration effects from the use of explosives for underground construction; however, this would not be expected to have a significant impact at the surface due to the depth of underground facilities and the requirements to minimise potential damage to the rock in which a GDF is constructed.

5.91. **Table 5.10** presents the findings of the appraisal of the draft NPS and the reasonable alternatives on noise (AoS Objective 8) in the context of the possible impacts identified above. Effects have been identified for the draft NPS topic sub-sections (Applicant's Assessment, Decision Making and Mitigation) as well as for the draft NPS as a whole (cumulative effects).

Table 5.10 Appraisal of the draft NPS and reasonable alternatives: noise

Noise	Applicant's Assessment	Decision Making	Mitigation	Cumulative Effects
Draft NPS	+	+	+/?	+
Draft NPS including Exclusionary Criteria	++	++	+/?	++
No NPS	+/?	+/?	+/?	+/?

Draft NPS

5.92. The draft NPS requires the identification and assessment of noise aspects through a noise assessment as part of an ES. It draws attention to how, with respect to human receptors, noise should be assessed with reference to the relevant British Standards and other guidance and advises that the applicant consults the Environment Agency on the likely scope of an environmental permit and Natural England with regard to the assessment of noise aspects on protected species or other wildlife. At paragraph 5.3.11, meanwhile, it makes clear that the Secretary of State "should not grant development consent unless satisfied that the proposals will meet the following aims, within the context of Government policy on sustainable development:

- avoid significant adverse impacts on health and quality of life from noise as a result of new development;
- mitigate and minimise other adverse impacts on health and quality of life from noise from new development; and
- where possible, contribute to improvement to health and quality of life through the effective management and control of noise".

5.93. The guidance contained in Chapter 5 of the draft NPS is expected to help ensure that the development of geological disposal infrastructure does not result in significant adverse impacts on noise. Additionally, other topics contained in Chapter 5 (including traffic and transport and health) and the draft NPS assessment principles may also help to ensure that measures are adopted to avoid/mitigate adverse noise impacts generating further positive effects in respect of this AoS objective.

5.94. At paragraph 5.3.15, the draft NPS identifies a number of potential measures to mitigate noise impacts, including: the containment of noise generated; use of materials that

reduce noise; adoption of adequate distances between source and noise-sensitive receptors; the incorporation of good design to minimise noise transmissions through screening by natural or purpose built barriers; and the specification of acceptable noise limits or times of use. The draft NPS also highlights that the Secretary of State should, in determining an application, consider whether mitigation measures are needed, over and above any which may form part of the development consent application. It provides that the Secretary of State may wish to impose requirements to ensure the delivery of all mitigation measures and that the noise levels from a proposed development do not exceed those described in the noise assessment or any other estimates on which the decision was based. However, the assessment contained in **Appendix B** highlights that the measures identified in the draft NPS could be revised to be more specific and clearly reflect the potential effects associated with the key project stages of geological disposal infrastructure. This is discussed further below (see 'Mitigation and Enhancement' and all mitigation measures are collated in **Appendix C**).

5.95. Overall, it is considered that the draft NPS will have a positive effect on this AoS objective as it will help to minimise noise and vibration effects from geological disposal infrastructure construction and operational activities, notably on sensitive locations and receptors.

Draft NPS including exclusionary criteria

5.96. Positive effects on AoS Objective 8 associated with this reasonable alternative are expected to be broadly similar to those identified in respect of the draft NPS above. However, it is considered that the adoption of exclusionary criteria is likely to yield additional benefits on this AoS objective by introducing protection to designated nature conservation sites, heritage assets and landscapes, although there could be unintended effects associated with increased development pressure on areas not given specific protection and which may be sensitive to noise impacts (for example, tranquil areas).

5.97. Overall, this alternative has been assessed as having a significant positive effect on AoS Objective 8.

No NPS

5.98. The construction, operation and decommissioning/closure of geological disposal infrastructure would be undertaken in accordance with statutory noise regulations and proposals would be assessed using relevant guidance/standards such as World Health Organization (WHO) guidelines for community noise and relevant British Standards as part of an Environmental Impact Assessment. Environmental permits under the Environmental Permitting (England and Wales) Regulations 2016 may also cover noise and it is expected that development would be undertaken in accordance with national planning policy and national policy on noise such as the Noise Policy Statement for England. This position would be maintained without a NPS. However, the absence of a clear statement regarding the full range of information to be submitted with regards to noise in an ES may mean that opportunities are lost to effectively identify, assess and mitigate noise impacts. Similarly, the absence of a clear statement on the role of the Secretary of State, including in ensuring that development avoids significant adverse noise impacts, risks uncertain effects on receptors.

5.99. Overall, this alternative has been assessed as having a positive effect on AoS Objective 8, although a degree of uncertainty persists.

Climatic factors

5.100. The construction, operation and decommissioning/closure of geological disposal infrastructure will generate greenhouse gas emissions which contribute to climate change. Sources of emissions will include, for example, transport movements to and from site, the use of powered plant, the embodied carbon within materials and emissions associated with energy use. Development, particularly surface facilities, may be affected by the impacts of climate change such as an increased frequency of extreme weather events, flood risk and sea level rise, particularly given the extended lifetime of a GDF.

5.101. The development of the GDF provides the safe and secure management of the UK's higher activity radioactive waste which will indirectly contribute to greater certainty and the management of risks to support the future nuclear energy industry and the generation of low carbon new nuclear power, which in turn will contribute to the long-term achievement of the UK's objectives on climate change and energy security[64].

5.102. **Table 5.11** presents the findings of the appraisal of the draft NPS and the reasonable alternatives on climatic factors (AoS Objective 9) in the context of the possible impacts identified above. Effects have been identified for the draft NPS topic sub-sections (Applicant's Assessment, Decision Making and Mitigation) as well as for the draft NPS as a whole (cumulative effects).

Table 5.11 Appraisal of the draft NPS and reasonable alternatives: climatic factors

Climatic Factors	Applicant's Assessment	Decision Making	Mitigation	Cumulative Effects
Draft NPS	+	+	+	+
Draft NPS including Exclusionary Criteria	+	+	+	+
No NPS	+/?	+/?	+/?	+/?

Draft NPS

5.103. The draft NPS seeks to ensure that the carbon impacts of development are assessed by the applicant and appropriate mitigation measures implemented in order to reduce carbon emissions arising from geological disposal infrastructure. One of the six assessment principles set out in Table 1 (Section 4.1) of the draft NPS, meanwhile, concerns climate change adaptation. In this context, the draft NPS makes clear that applicants must consider the projected impacts of climate change when planning the location, design, build, operation, decommissioning and final closure of a GDF and at paragraph 5.5.10 states that "The Secretary of State should refuse development consent if the applicant has failed to show they have considered the impact of climate change over the lifetime of the proposed development and not built in adaptability to a range of potential future climatic environments". In consequence, it is anticipated that the draft NPS will help to ensure a low carbon design solution to the disposal of higher activity radioactive waste and the promotion of climate change adaptation and

[64] DECC (now BEIS) (July 2014), 'Implementing Geological Disposal - A Framework for the long-term management of higher activity radioactive waste' paragraph 1.18 and BERR (now BEIS) (January 2008), 'Meeting the Energy Challenge – A White Paper on Nuclear Power', paragraph 3.1.

resilience. Further, by helping to ensure that long-term provision is made for the management of waste in the inventory for disposal, the draft NPS will indirectly contribute to greater certainty and the management of risks to support the future nuclear energy industry and the generation of low carbon new nuclear power.

5.104. The draft NPS places a strong emphasis on the need for applicants to identify, and the Secretary of State to assess the effectiveness of, mitigation measures in respect of climate change. However, it is noted that the range of mitigation measures identified in Chapter 5 of the draft NPS is limited and no measures are specifically identified in respect of climate change adaptation (although it is recognised that the developer of a GDF would need to demonstrate to the independent nuclear regulators that the site of a GDF was adequately protected from external hazards arising from natural processes taking account of the potential effects of climate change, such as extreme weather event). This is discussed further below (see 'Mitigation and Enhancement' and all mitigation measures are collated in **Appendix C**).

5.105. Overall, the draft NPS has been assessed as having a positive effect on this AoS objective.

Draft NPS including exclusionary criteria

5.106. Positive effects on AoS Objective 9 associated with this reasonable alternative are expected to be broadly similar to those identified in respect of the draft NPS above. The setting of clear parameters on siting which excludes landscape, cultural and natural heritage assets could limit areas for development and increase the potential for (particularly associated) development being located in areas subject to, for example, flood risk. However, given the requirements of national planning policy and the draft NPS this would be unlikely.

No NPS

5.107. Applications for development consent in respect of geological disposal infrastructure will be subject to the provisions of national planning policy and the Environmental Impact Assessment Regulations which would be expected to help ensure that consideration is given to climate change impacts, mitigation and adaptation. This position would be maintained under this alternative. However, the absence of a clear statement on the full range of information to be submitted in an ES and guidance to the Secretary of State in respect of when development should be refused on the grounds of climate change risks applicants not effectively identifying and mitigating greenhouse gas emissions and providing effective adaptation.

5.108. Overall, this alternative has been assessed as having a positive effect on AoS Objective 9, although a degree of uncertainty persists.

Waste and resources

5.109. The development of geological disposal infrastructure will require significant volumes of resources including concrete and steel as well as natural resources such as water. During the lifetime of a GDF, and particularly during construction, large quantities of waste will also be generated. However, its operation will contribute towards the safe and secure management of the UK's higher activity radioactive waste in the long term.

5.110. **Table 5.12** presents the findings of the appraisal of the draft NPS and the reasonable alternatives on waste and resources (AoS Objective 10) in the context of the possible impacts identified above. Effects have been identified for the draft NPS topic sub-

sections (Applicant's Assessment, Decision Making and Mitigation) as well as for the draft NPS as a whole (cumulative effects).

Table 5.12 Appraisal of the draft NPS and reasonable alternatives: waste and resources

Waste and Resources	Applicant's Assessment	Decision Making	Mitigation	Cumulative Effects
Draft NPS	+	+	+/?	+
Draft NPS including Exclusionary Criteria	+	+	+/?	+
No NPS	+/?	+/?	+/?	+/?

Draft NPS

5.111. The draft NPS promotes good design as an integral consideration from the outset of a proposal (see Section 4.5 of the draft NPS) and which is expected to help encourage the sustainable use of natural resources and material assets including through the re-use and recycling of recovered components and materials. The draft NPS also provides specific guidance for applicants and the Secretary of State in relation to the consideration of waste and which promotes the waste hierarchy. In particular, the draft NPS places a requirement on applicants to identify the arrangements for the management of waste and for the preparation of a site waste management plan.

5.112. It is important to note that, whilst the principle of geological disposal of higher activity radioactive waste has already been established and is therefore not the subject of this AoS, by providing a clear framework for decisions relating to geological disposal infrastructure the draft NPS will support the delivery of a GDF in a timely manner thereby helping to ensure the safe and secure management of the UK's higher activity radioactive waste in the long term.

5.113. Overall, it is considered that the draft NPS will help to ensure the sustainable use of resources and management of waste associated with geological disposal infrastructure generating a positive effect on this AoS objective. However, as currently drafted it is considered that greater specificity could be provided in terms of measures to promote the sustainable management of waste and resource use at key project stages. This is discussed further below (see 'Mitigation and Enhancement' and all mitigation measures are collated in **Appendix C**).

Draft NPS including exclusionary criteria

5.114. Positive effects on AoS Objective 10 associated with this reasonable alternative are expected to be broadly similar to those identified in respect of the draft NPS above. It should be noted that the setting of clear parameters for siting which excludes specific environmental and cultural assets may indirectly help to avoid adverse impacts on these sites/assets associated with the management of wastes arising from geological disposal infrastructure. The adoption of exclusionary criteria may also help to protect natural resources present in designated areas (such as SACs, SPAs and Ramsar sites). However, this is not considered to constitute a significant positive effect in the context of this AoS objective.

No NPS

5.115. Under this alternative, DCO applications for geological disposal infrastructure would be subject to the provisions of national planning policy and the Environmental Impact Assessment Regulations as well as a wide range of legislation at the European and national level on waste including the Waste Framework Directive. The environmental permitting regime also incorporates operational waste management requirements for certain activities. In the absence of a NPS, this policy and legislative framework would be expected to help ensure that decisions made by the Secretary of State take account of the impacts of geological disposal infrastructure development proposals on waste and resources, generating a positive effect on this AoS objective. However, the absence of a clear statement regarding waste considerations and impacts on resource use to be taken into account by the applicant and the Secretary of State (as proposed in the draft NPS) risks inconsistency in interpretation, particularly at a project level.

5.116. It is important to note that whilst proposals for geological disposal infrastructure would still be consistent with Council Directive 2011/70/Euratom (which broadly accepts that deep geological disposal represents the safest and most sustainable option as the end point of the management of high level waste) and would still be determined as nationally significant infrastructure projects in accordance with the Planning Act 2008, in the absence of a NPS there would be increased uncertainty in respect of the timely delivery of a GDF to ensure the safe and secure management of the UK's higher activity radioactive waste in the long term.

Traffic and transport

5.117. The development of geological disposal infrastructure will result in significant vehicle movements, particularly during the construction phase. The increase in vehicle movements could have a range of impacts on the surrounding transport network and on other connecting networks. Impacts could include congestion, severance to pedestrians/cyclists, loss of pedestrian/cyclist amenity, community severance in local settlements, driver delay and safety implications.

5.118. **Table 5.13** presents the findings of the appraisal of the draft NPS and the reasonable alternatives on traffic and transport (AoS Objective 11) in the context of the possible impacts identified above. Effects have been identified for the draft NPS topic sub-sections (Applicant's Assessment, Decision Making and Mitigation) as well as for the draft NPS as a whole (cumulative effects).

Table 5.13 Appraisal of the draft NPS and reasonable alternatives: traffic and transport

Traffic and Transport	Applicant's Assessment	Decision Making	Mitigation	Cumulative Effects
Draft NPS	**+/?**	**+**	**+**	**+**
Draft NPS including Exclusionary Criteria	**+/?**	**+/?**	**+**	**+/?**
No NPS	**+/?**	**+/?**	**+/?**	**+/?**

Draft NPS

5.119. The draft NPS requires that, where a proposed development is likely to have significant transport implications, the applicant prepares a transport assessment as part of an ES and in liaison with Highways England, the local highways authority, the rail network

operator(s), the Maritime and Coastguard Agency and Associated British Ports. It also requires that applicants prepare a travel plan including demand management measures to mitigate transport impacts and propose measures to improve access by public transport, walking and cycling. Where substantial impacts cannot be reduced, applicants may enter into planning obligations for funding infrastructure and mitigating adverse impacts. Should additional transport infrastructure be proposed, the draft NPS suggests that applicants should discuss with network providers the possibility of co-funding by Government for any third party benefits but this will be dependent on funding and so any related benefits are uncertain at this stage. Taking the guidance outlined above into account, the draft NPS is expected to help ensure that transport impacts associated with geological disposal infrastructure are identified, assessed and mitigated, generating a positive effect on this AoS objective.

5.120. The proposed mitigation measures set out in the draft NPS at paragraphs 5.12.7 to 5.12.11 include a preference for demand management measures over the provision of new transport infrastructure to manage transport impacts arising from geological disposal infrastructure and for rail and water-borne options over road transport options. At paragraph 5.12.8, it sets out that the Secretary of State should also aim to secure more sustainable patterns of transport development when considering mitigation measures. Where there is likely to be substantial Heavy Goods Vehicle (HGV) traffic, the draft NPS makes clear that applicants should set out how they will minimise associated impacts. This is expected to help reduce the need to travel (including by car), minimise road traffic and avoid adverse impacts associated with the provision of new transport infrastructure.

5.121. Overall, the draft NPS has been assessed as having a positive effect on AoS Objective 11. There is the potential for these positive effects to be enhanced, particularly through the identification of more specific mitigation measures. This is discussed further below (see 'Mitigation and Enhancement' and all mitigation measures are collated in **Appendix C**).

Draft NPS including exclusionary criteria

5.122. The effects of this reasonable alternative on AoS Objective 11 would be similar to those identified in respect of the draft NPS above, although the effects are considered to be more uncertain. Whilst the setting of clear parameters on siting which excludes landscape, cultural and natural heritage assets could avoid locating development within designated areas that may already have traffic problems, it may also reduce the potential scope for the provision of new transportation infrastructure to serve nationally significant infrastructure projects in the most effective locations.

5.123. Overall, this alternative has been assessed as having a positive effect on AoS Objective 11, although a degree of uncertainty persists.

No NPS

5.124. Under this alternative, DCO applications would be subject to the provisions of national planning policy and the Environmental Impact Assessment Regulations. Whilst this would help to ensure that transport impacts associated with the development of geological disposal infrastructure are identified, assessed and mitigated, the absence of a clear statement regarding traffic and transport considerations and the role of the Secretary of State (as proposed in the draft NPS) risks inconsistency in interpretation, particularly at a project level.

5.125. Overall, this alternative has been assessed as having a positive effect on AoS Objective 11, although a degree of uncertainty persists.

Cultural heritage

5.126. The development of geological disposal infrastructure could have a range of impacts on the significance of cultural heritage assets. These impacts may include, for example, direct disturbance, damage to or loss of designated and non-designated assets or artefacts above or below ground, indirect damage through, for example, dewatering of remains preserved through waterlogging and fragmentation or severance of linked features. Development may also result in changes to the setting of designated and non-designated historic assets such as listed buildings, scheduled monuments or historic landscapes.

5.127. Impacts on cultural heritage assets would primarily relate to the development of surface facilities. This reflects the fact that the underground elements of a GDF would be at depths of between 200 metres and 1,000 metres such that development would not have any direct impact on heritage assets or indirect impacts on setting. Similarly, vibration effects from the use of explosives for underground construction would not be expected to have a significant impact at the surface due to the distances involved and the requirements to minimise potential damage to the rock in which a GDF is constructed.

5.128. **Table 5.14** presents the findings of the appraisal of the draft NPS and the reasonable alternatives on cultural heritage (AoS Objective 12) in the context of the possible impacts identified above. Effects have been identified for the draft NPS topic sub-sections (Applicant's Assessment, Decision Making and Mitigation) as well as for the draft NPS as a whole (cumulative effects).

Table 5.14 Appraisal of the draft NPS and reasonable alternatives: cultural heritage

Cultural Heritage	Applicant's Assessment	Decision Making	Mitigation	Cumulative Effects
Draft NPS	**+**	**+**	**+/?**	**+**
Draft NPS including Exclusionary Criteria	**++/?**	**++/?**	**+/?**	**++**
No NPS	**+/?**	**+/?**	**+/?**	**+/?**

Draft NPS

5.129. The requirement in the draft NPS for applicants to assess the likely effects of geological disposal infrastructure on cultural heritage assets as part of an ES will help to ensure that impacts in this regard are taken into account. However, as proposed the draft NPS does not provide guidance on the contents of an ES with regard to cultural heritage.

5.130. The draft NPS makes clear that the Secretary of State should give 'great weight' to the conservation of heritage assets and sets out in detail the range of considerations which will be part of the decision making process. At paragraph 5.6.16, it sets out that, where the proposed development will lead to substantial harm to or total loss of significance of a designated heritage asset, the Secretary of State "should refuse consent unless it can be demonstrated that the substantial harm or loss of significance is necessary to deliver substantial public benefits that outweigh that loss or harm, or all of the following apply:

- the nature of the heritage asset prevents all reasonable uses of the site;

- no viable use of the heritage asset itself can be found in the medium term through appropriate marketing that will enable its conservation;
- conservation by grant-funding or some form of charitable or public ownership is demonstrably not possible; and
- the harm or loss is outweighed by the benefit of bringing the site back into use".

5.131. The draft NPS also promotes the enhancement of assets and at paragraph 5.6.20 states that applicants "should look for opportunities for new development within Conservation Areas and World Heritage Sites, and within the setting of heritage assets, to enhance or better reveal their significance. Proposals that preserve those elements of the setting that make a positive contribution to or better reveal the significance of the asset should be treated favourably".

5.132. The guidance outlined above reflects policy set out in the NPPF with regard to conserving and enhancing the historic environment (Section 12, paragraphs 126 – 141) and will help to ensure that due consideration is given to impacts on cultural heritage in decision making and opportunities for enhancement sought.

5.133. Where cultural heritage interests are affected, the draft NPS provides for the application of mitigation measures. This includes the use of conditions or obligations and the recording of affected assets. However, it is considered that these measures could be more specific in their detail, addressing effects at key project stages and providing further guidance in respect of opportunities for enhancement. This is discussed further below (see 'Mitigation and Enhancement' and all mitigation measures are collated in **Appendix C**).

5.134. It should be noted that there are links between cultural heritage and other topics contained in Chapter 5 of the draft NPS including, in particular, landscape and visual impacts. The requirement for applicants to include design as an integral consideration from the outset of a proposal in Section 4.5 of the draft NPS may also help to ensure that impacts on cultural heritage assets and their setting are minimised and opportunities sought to enhance assets.

5.135. Overall, the implementation of the draft NPS is likely to result in a positive effect in respect of AoS Objective 12.

Draft NPS including exclusionary criteria

5.136. Positive effects on AoS Objective 12 associated with this reasonable alternative are expected to be similar to those identified in respect of the draft NPS above, although the magnitude of effect would be greater. This reflects the expectation that the exclusion of siting of geological disposal infrastructure affecting designated cultural heritage assets such as World Heritage Sites would help to avoid adverse impacts on the significance of these assets, providing greater certainty with respect to the location of development.

5.137. However, simply excluding works from within a cultural heritage asset such as a World Heritage Site would not necessarily exclude the possibility of adverse effects on the significance of such assets (although the general risk of adverse effects is assumed to be reduced). In particular, adverse effects on the setting of a World Heritage Site could still arise if geological disposal facilities were sited adjacent or close to the boundary of a site, although it would be expected that the significance of any such effects could be reduced through the implementation of appropriate mitigation such as good design and consideration of layout. Additionally, there is the potential for unintended effects to be produced as a consequence of greater development pressure on areas/sites not

afforded such high levels of protection. Whilst this is currently uncertain (as reflected in the scoring in **Table 5.14**), given existing policy and legislation on cultural heritage and the requirements of the draft NPS, such unintended effects are considered to be unlikely to occur.

5.138. It is important to note that existing national planning policy and legislation, together with the requirements of the draft NPS (as proposed), provide for the protection of cultural heritage assets such that it can be reasonably expected that the potential for adverse impacts in this regard would be fully considered at the project stage. Even where there is the potential for adverse impacts to arise as a result of the development of geological disposal infrastructure, in many cases it is likely that these impacts could be avoided, minimised or mitigated through, for example, design measures (and in accordance with the provisions of the draft NPS).

5.139. Overall, this alternative has been assessed as having a significant positive effect on AoS Objective 12.

No NPS

5.140. Under this alternative, national planning policy and legislation relating to the protection of cultural heritage assets such as the Planning (Listed Buildings and Conservation Areas) Act 1990 and the Ancient Monuments and Archaeological Areas Act 1979 would continue to apply whilst DCO applications would be subject to the provisions of the Environmental Impact Assessment Regulations which would help to ensure that the impacts of geological disposal infrastructure on cultural heritage assets are identified and assessed. However, the absence of a clear statement regarding the full range of considerations to be taken into account by the applicant and Secretary of State (as proposed in the draft NPS) risks inconsistency in interpretation, particularly at a project level. It may also result in opportunities for the mitigation of adverse impacts and enhancement of benefits being missed.

5.141. Overall, this alternative has been assessed as having a positive effect on AoS Objective 12, although a degree of uncertainty persists.

Landscape and townscape

5.142. Potential impacts associated with the development of geological disposal infrastructure on landscape/seascape and visual amenity are likely to be similar to other major developments and could include the loss or fragmentation of, or damage to, landscape features, changes in overall landscape character, visual intrusion through the introduction of new, contrasting elements into existing views, or the obstruction of existing views and light pollution associated with construction/operation works.

5.143. Landscape and visual impacts would primarily relate to the development of surface facilities. The underground elements of a GDF would be at depths of between 200 metres and 1,000 metres meaning that development would not affect landscape character (including designated landscapes/features) or visual amenity.

5.144. **Table 5.15** presents the findings of the appraisal of the draft NPS and the reasonable alternatives on landscape and townscape (AoS Objective 13) in the context of the possible impacts identified above. Effects have been identified for the draft NPS topic sub-sections (Applicant's Assessment, Decision Making and Mitigation) as well as for the draft NPS as a whole (cumulative effects).

Table 5.15 Appraisal of the draft NPS and reasonable alternatives: landscape and townscape

Landscape and Townscape	Applicant's Assessment	Decision Making	Mitigation	Cumulative Effects
Draft NPS	+	+/?	+/?	+/?
Draft NPS including Exclusionary Criteria	++/?	++/?	+/?	++/?
No NPS	+/?	+/?	+/?	+/?

Draft NPS

5.145. The draft NPS provides clear guidance, and reference to more detailed external guidance, on how landscape and visual impacts should be taken into account by applicants and the Secretary of State. Reference is made to the role of existing studies in helping to determine the context within which the development could or will take place, the diversity of considerations associated with landscape (visual amenity, tranquillity, historic landscapes) and the importance of considering the likely effects associated with the different project stages. The draft NPS also identifies that any application for development consent that could affect landscapes of national significance (such as National Parks and Areas of Outstanding Natural Beauty) will need to comply with the provisions of the relevant legislation. The provisions of the draft NPS in this regard should lead to positive effects on this AoS objective.

5.146. The draft NPS directs the Secretary of State to place great weight on the importance of conserving nationally significant landscapes and at paragraph 5.10.9 states that development consent should be refused in these areas except in 'exceptional circumstances' and where it can be demonstrated that it is in the public interest. Where consent is granted, the draft NPS states that the Secretary of State "should be satisfied that the applicant has ensured that the proposed development will be carried out to higher environmental standards and where possible, include measures to enhance other aspects of the environment. Where necessary, the Secretary of State should consider the imposition of appropriate requirements to ensure these standards are delivered" (paragraph 5.10.10). Notwithstanding the importance attached to nationally significant landscapes in the draft NPS, there is a degree of uncertainty as there remains the potential for development in these areas. This is reflected in the scoring contained in **Table 5.15**.

5.147. The draft NPS provides for the application of mitigation measures such as design and landscaping to address adverse landscape and visual impacts. The requirement for applicants to include design as an integral consideration from the outset of a proposal in Section 4.5 of the draft NPS will also help to ensure that landscape and visual impacts are minimised and opportunities sought to enhance assets. In this regard, paragraph 4.5.7 sets out:

"When making a decision on an application for development consent for geological disposal infrastructure, the Secretary of State should consider siting and design measures to minimise adverse impacts, so far as reasonably practicable, on the existing:

- landscape, taking into account its historical character and function;
- landform, taking into account its visual impact on the surroundings; and

- vegetation, taking into account disturbance and impact on sustainability.

Furthermore, the design and sensitive use of materials in any associated development will assist in ensuring that such development contributes to the quality of the area".

5.148. However, it is considered that the measures identified in the draft NPS could be more specific in their detail, addressing effects at key project stages. This is discussed further below (see 'Mitigation and Enhancement' and all measures are collated in **Appendix C**).

5.149. Overall, application of the draft NPS is likely to result in positive, albeit uncertain effects in respect of AoS Objective 13.

Draft NPS including exclusionary criteria

5.150. Positive effects on AoS Objective 13 associated with this reasonable alternative are expected to be similar to those identified in respect of the draft NPS above, although the magnitude of effect would be greater. This reflects the expectation that the exclusion of siting of geological disposal infrastructure in designated landscapes such as National Parks and AONBs would help to avoid adverse impacts on these assets, providing greater certainty with respect to the location of development.

5.151. However, simply excluding works from within a designated landscape such as a National Park or AONB would not necessarily exclude the possibility of adverse effects on the setting of such assets (although the general risk of adverse effects is assumed to be reduced). In particular, adverse effects on the setting of designated landscapes could still arise if geological disposal facilities were sited adjacent or close to the boundary of a site, although it would be expected that the significance of any such effects could be reduced through the implementation of appropriate mitigation such as good design and consideration of layout. There is also the potential for unintended effects to be produced as a consequence of greater development pressure on areas/landscapes not afforded such high levels of protection. Whilst this is currently uncertain (as reflected in the scoring in **Table 5.15**), given existing policy and legislation on landscape, as well as the requirements of the draft NPS, such unintended effects are considered to be unlikely to occur.

5.152. It is important to note that existing national planning policy and legislation, together with the requirements of the draft NPS (as proposed), provide for the protection of designated landscapes such that it can be reasonably expected that the potential for adverse impacts in this regard would be fully considered at the project stage. Even where there is the potential for adverse impacts to arise as a result of the development of geological disposal infrastructure, in many cases it is likely that these impacts could be avoided, minimised or mitigated through, for example, design measures (and in accordance with the provisions of the draft NPS).

5.153. Overall, this alternative has been assessed as having a significant positive effect on AoS Objective 13.

No NPS

5.154. Under this alternative, national planning policy and legislation relating to landscape and visual impacts would continue to apply whilst DCO applications would be subject to the provisions of the Environmental Impact Assessment Regulations which would help to ensure that landscape and visual impacts assets are identified and assessed. However, the absence of a clear statement regarding the full range of considerations to be taken into account by the applicant and Secretary of State (as proposed in the draft NPS) risks

inconsistency in interpretation, particularly at a project level. It may also result in opportunities for the mitigation of adverse impacts and enhancement of benefits being missed.

5.155. Overall, this alternative has been assessed as having a positive effect on AoS Objective 13, although a degree of uncertainty persists.

Summary of the likely significant effects of the draft NPS and the reasonable alternatives

5.156. **Table 5.16** summarises the potential cumulative effects of the guidance and mitigation contained in the draft NPS (in terms of the three sub-sections used for each topic within Chapter 5 of the draft NPS (Applicant's Assessment; Decision Making; and Mitigation) against the 13 AoS objectives, along with the performance of the reasonable alternatives.

Table 5.16 Summary of the likely significant effects of the draft NPS and the reasonable alternatives

Alternatives	AoS Objective												
	1. Biodiversity	2. Population	3. Human Health	4. Land Use	5. Water	6. Flood Risk and Coastal Change	7. Air	8. Noise	9. Climatic Factors	10. Waste and Resources	11. Traffic and Transport	12. Cultural Heritage	13. Landscape and Townscape
Draft NPS	+	+	+	+/?	+	+	+	+	+	+	+	+	+/?
Draft NPS including Exclusionary Criteria	++	+/?	+	+/?	+	+	++	++	+	+	+/?	++	++/?
No NPS	+/?	+/?	+/?	+/?	+/?	+/?	+/?	+/?	+/?	+/?	+/?	+/?	+/?

Draft NPS

5.157. The construction, operation and decommissioning/closure of geological disposal infrastructure could have a wide range of socio-economic and environmental impacts. Due to the depth of the underground elements of a GDF (which would be at depths of between 200 metres and 1,000 metres), these impacts would be predominantly associated with the development of surface facilities. By providing policy and guidance to nationally significant infrastructure project developers, the Examining Authority and the Secretary of State, the draft NPS will help to ensure that these impacts are identified, appropriately assessed and, where necessary, avoided, minimised or mitigated.

5.158. The guidance contained in the draft NPS including the assessment principles may also help to ensure that benefits associated with the development of geological disposal infrastructure are realised. These benefits may include, for example, the delivery of legacy benefits to host communities related to the provision of community infrastructure

and services or environmental improvements such as habitat enhancement. In this regard, the draft NPS makes clear that the Secretary of State should consider whether appropriate requirements should be attached to any consent, or included in any planning obligations entered into, in order to ensure that mitigation and enhancement measures are delivered.

5.159. Whilst the principle of geological disposal of higher activity radioactive waste has already been established and is therefore not the subject of this AoS, by providing a clear framework for decisions relating to geological disposal infrastructure the draft NPS will support the delivery of a GDF in a timely manner. This will help to ensure the safe and secure management of the UK's higher activity radioactive waste in the long term. In this context, the draft NPS will indirectly minimise any risks or consequences arising from the current interim storage of higher activity wastes and which could impact on human health. Further, through releasing land currently associated with the storage of intermediate level waste, there may be beneficial effects in respect of land use. Geological disposal will also support the future nuclear industry, helping to promote low carbon new nuclear power generation.

5.160. Overall, the draft NPS has been assessed as having long-term, permanent positive effects across all of the AoS objectives. No negative effects (significant or minor) have been identified although there is the potential for positive effects associated with the implementation of the draft NPS to be enhanced. This is discussed further below (see 'Mitigation and Enhancement' and all measures are collated in **Appendix C**).

Draft NPS including exclusionary criteria

5.161. Effects on the AoS objectives associated with this reasonable alternative are expected to be broadly similar to those identified in respect of the draft NPS above. However, the setting of clear parameters for siting which excludes specific environmental and cultural assets would be likely to provide greater certainty in respect of the location of geological disposal infrastructure and would help to reduce the likelihood that adverse impacts on these assets could occur. In consequence, this reasonable alternative has been assessed as having a significant, long-term and permanent positive effect on AoS Objective 1 (Biodiversity and Nature Conservation), AoS Objective 12 (Cultural Heritage) and AoS Objective 13 (Landscape and Townscape). This reasonable alternative may also generate additional, indirect positive effects on a number of the other AoS objectives by helping to avoid adverse impacts on, for example, water quality and resources in excluded areas. In this regard, positive effects on AoS Objective 7 (Air) and AoS Objective 8 (Noise) have been assessed as significant.

5.162. Notwithstanding the benefits outlined above, the adoption of exclusionary criteria may not necessarily exclude the possibility of adverse effects occurring (although the general risk of adverse effects is assumed to be reduced). In particular, adverse effects could still arise if geological disposal infrastructure were sited adjacent or close to the boundary of a designated site or asset. In addition, the adoption of exclusionary criteria could result in unintended effects arising from increased development pressure on areas that, whilst not designated, may be sensitive to development (for example, areas at risk of flooding) or have value in terms of, for example, the economy or mineral resources. Although it would be expected that the significance of any such effects could be reduced through the implementation of appropriate mitigation such as appropriate siting, good design and consideration of layout.

5.163. Further, under this alternative the Government would be prejudging the suitability of some sites before all the facts are available thereby unduly restricting the siting of

geological disposal infrastructure. This could reduce the potential scope for the provision of new infrastructure to serve nationally significant infrastructure projects in suitable and sustainable locations.

No NPS

5.164. Under this alternative, geological disposal infrastructure would be determined by the Secretary of State as a nationally significant infrastructure project in accordance with the Planning Act 2008 (as amended). Applications would be subject to the provisions of national planning policy and the Environmental Impact Assessment Regulations as well as legislation in respect of, for example, the protection of international and national habitats and species, cultural heritage, air quality and contaminated land. Alongside policy and guidance contained in other plans and programmes (such as local plans, marine plans and flood risk management plans), this would be expected to help ensure that socio-economic and environmental impacts associated with the development of geological disposal infrastructure are identified, assessed and minimised/mitigated.

5.165. Issues relating to discharges or emissions which affect air quality, water quality, land quality and the marine environment (or which include noise and vibration) would be subject to separate regulation under the pollution control framework or other consenting or licensing regimes. Any activities within the development that are regulated under those regimes will need to obtain the relevant permissions before the activities can be undertaken. Geological disposal infrastructure (including deep investigative boreholes and the GDF itself) will also require environmental permits from the Environment Agency under the Environmental Permitting (England and Wales) Regulations 2016. These existing regulatory controls will help to ensure that environmental impacts associated with the development of geological disposal infrastructure are acceptable.

5.166. It should also be noted that the independent Office for Nuclear Regulation is responsible for the safety and security regulation of the nuclear sector across the UK. A GDF will be a nuclear installation under the Nuclear Installations Act 1965 and, as such, it will be the Office for Nuclear Regulation's role to ensure that, prior to construction of a GDF, a licensing process is in place such that the Office for Nuclear Regulation can consider the granting of a licence for the site, with the requisite site licence conditions attached, and enforce the requirements of that licence. The Office for Nuclear Regulation will also be responsible for advice, assessment of the licensee's security, and approving security arrangements for the geological disposal facility, and for securing compliance with those arrangements.

5.167. Despite the policy and legislative framework outlined above, the absence of a clear statement regarding the full range of considerations to be taken into account by the applicant and Secretary of State (as proposed in the draft NPS) risks inconsistency in interpretation, particularly at a project level. It may also result in opportunities for the mitigation of adverse impacts and enhancement of benefits being missed. In consequence, whilst this alternative has been assessed as having a positive effect across the majority of the AoS objectives, a higher degree of uncertainty persists.

5.168. Under this alternative, proposals for geological disposal infrastructure would still be consistent with Council Directive 2011/70/Euratom (which broadly accepts that deep geological disposal represents the safest and most sustainable option as the end point of the management of high level waste) and proposals would still be determined as nationally significant infrastructure projects in accordance with the Planning Act 2008. However, the absence of a clear framework for decisions relating to geological disposal infrastructure would lead to increased uncertainty in respect of the timely delivery of a

GDF to ensure the safe and secure management of the UK's higher activity radioactive waste in the long term.

Mitigation and enhancement

5.169. As highlighted above (see 'Evolution of the Draft NPS'), the AoS has been undertaken iteratively alongside the development of the draft NPS in order to enhance its sustainability performance. Based on the appraisal of the draft NPS (as proposed), further measures have been identified to enhance the sustainability of the document. These measures are included within each of the topic-based assessments in **Appendix B** and are presented separately in **Appendix D**.

5.170. The recommendations arising from the appraisal predominantly relate to the impacts contained in Chapter 5 of the draft NPS. A number of measures to enhance the draft NPS cut-across several of the AoS objectives and draft NPS topics. These cross-cutting measures include:

- the inclusion of direct reference to the Planning Practice Guidance;
- the need for further guidance in respect of when the Secretary of State should refuse consent in the context of water and waste; and
- the potential for greater specificity in terms of the suite of measures that could be implemented to address impacts during the key stages of the project life cycle (construction, operation and decommissioning/closure).

5.171. Based on the findings of the AoS, it is also considered that the guidance contained in the 'Applicant's Assessment' sub-sections of Chapter 5 could make more explicit the requirements in respect of the content and scope of an Environmental Statement (ES) (as required). Such guidance would go beyond reference to the Planning Practice Guidance and Schedule 4 of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 to reflect the issues relevant to GDF related nationally significant infrastructure projects and to ensure consistency across each of the impacts considered in Chapter 5. This guidance could cover (for each topic):

- the broad scope and methodology for assessment including reference to relevant guidance and thresholds of significance (recognising that the scope of an ES will be fully determined at the project stage);
- the identification and characterisation of existing baseline conditions (and their evolution without the proposed geological disposal infrastructure);
- the identification, description and assessment of effects (including the determination of whether any effects would be significant and also including the consideration of any cumulative effects);
- any mitigation and enhancement measures (as necessary); and
- any relevant proposed monitoring arrangements.

5.172. Further recommendations relating to the scope of an ES in respect of individual topics are detailed in **Appendix B** and all measures are collated in **Appendix C**.

Transboundary effects

5.173. The appraisal presented above has found that the implementation of the draft NPS will have positive effects across all of the AoS objectives, although no significant positive effects are predicted to occur. This reflects the expectation that the policy and guidance for the nationally significant infrastructure project developer, the Examining Authority and the Secretary of State contained in the draft NPS will, alongside prevailing national planning policy, legislation and regulatory regimes, provide a positive framework that helps to ensure the potential adverse impacts of geological disposal infrastructure development are identified, appropriately assessed and, where necessary, avoided, minimised or mitigated.

5.174. As the draft NPS relates to England only and the AoS has found that it will have no significant effects across the AoS objectives, it is concluded that implementation of the NPS will have no significant transboundary effects. The transboundary effects (if any) of individual proposals for geological disposal infrastructure will be considered at project-level as part of the development consent process.

Secondary, cumulative and synergistic effects

5.175. In determining the significance of effects of a plan or programme, the SEA Directive requires that consideration is given to the secondary, cumulative and synergistic nature of the effects. The cumulative effects (including, where relevant, consideration of secondary and synergistic effects) of the draft NPS on the AoS objectives have, where appropriate, been included in the detailed assessment in **Appendix B** and in the sections above.

5.176. **Table 5.17** provides a summary of cumulative effects of the draft NPS itself based on the cumulative effects and associated scores set out in Tables 5.3 to 5.15.

Table 5.17 Summary of cumulative effects

Topic	Key Baseline Information and Issues	Likely Significance	Summary
1. Biodiversity and Nature Conservation	• Some 57% of SSSI sites, 37% of SACs, 86% of Ramsar sites and 78% of SPAs were reported as in favourable condition. • Population trends of the 213 UK priority species had fallen by 67% since 1970, although, there was no significant decline in the period between 2007 and 2012. • A 2016 State of Nature Report using records of 3,815 species found that some 56% of these	+	The construction, operation, decommissioning and closure of geological disposal infrastructure, and particularly surface facilities, could have a wide range of impacts on biodiversity. This would principally be as a result of the loss or fragmentation of habitat or disturbance from activities on site and HGV movements. Whilst any cumulative, secondary or synergistic effects would not be at a national scale, individual European sites could potentially be affected depending on the location of the proposed infrastructure. The draft NPS sets out how the interests of protected areas/sites should be considered by the applicant, the Examining Authority and the Secretary of State. The NPPF, the Habitats Regulations requirements and the

Topic	Key Baseline Information and Issues	Likely Significance	Summary
	have declined since 1970.		Environmental Impact Assessment Regulations will ensure that the likely effects on biodiversity and nature conservation are comprehensively identified, assessed and where necessary mitigated. Given the continued application of the legal and policy protection given to SACs, SPAs, Ramsar sites and to SSSIs, and the clear framework to guide decision making on geological disposal infrastructure, the effects of the draft NPS are likely to be positive. In addition, the draft NPS provides for the application of clear mitigation measures, addressing direct and indirect effects, and promoting conservation and enhancement of biodiversity interests. In consequence, the cumulative effects of the draft NPS on the biodiversity AoS objective are considered to be positive.
2. Population, Economics and Skills	• The growing population within the UK will increase population densities and developed areas and, in turn, could increase the likelihood of communities being within proximity to a GDF or transport of higher activity wastes.	**+**	The construction and operation of geological disposal infrastructure will have positive economic impacts such as job creation, spend in the local economy and investment in the supply chain. The Radioactive Waste Management Ltd (December 2016) Geological Disposal Generic Socio-economic Assessment estimates that up to 1,600 full time equivalent jobs will be supported at a national level as an annual average over the lifetime of a GDF. Of these, 500 – 600 will be direct full time equivalent jobs, i.e. people directly employed in the planning, construction, operation and eventual closure of the facility. The majority of these would be skilled jobs. The remainder will be additional jobs supported in the supply chain (indirect jobs) or supported by increased spending in the wider economy (induced jobs). In relation to economic development, at a district level, the additional expenditure in the economy associated with a GDF is expected to range from around £3.4 billion to £8.3 billion in undiscounted spend over the lifetime of the project. At a regional level, once the district effects are subtracted, the economic development benefits are expected to range from £2.4 billion to £5.4 billion (undiscounted) over the same period. At the national level, the economic development benefits are expected to range from £7.8 billion to £37.9 billion

Topic	Key Baseline Information and Issues	Likely Significance	Summary
			(undiscounted). The Socio-economic Assessment highlights that development of a GDF may result in a modest reduction in property values within a few kilometres of a proposed site (although a positive impact on property values is likely in the longer term once a facility is constructed and operating). Depending on its location, a GDF could also have adverse impacts on leisure tourism. Such effects are associated with changed perceptions of an area as a place to live, work or invest and could be manifest during the siting process. Notwithstanding the socio-economic impacts identified above, it is important to note that the number of workers required at any one time during the construction and operational phases of a GDF would be relatively small. This reflects the length of these phases (approximately 150 years). In consequence, any socio-economic impacts associated with a GDF would likely be limited. The draft NPS provides guidance that is expected to help ensure that cumulative adverse socio-economic impacts associated with the development of geological disposal infrastructure are identified, assessed and, where appropriate, mitigated and that opportunities to maximise the cumulative positive impacts (such as jobs creation and investment in skills) are realised. In consequence, the cumulative effects of the draft NPS on the population, economics and skills AoS objective are considered to be positive.
3. Human Health	• Health inequalities exist in many communities. This is due to a number of factors (and the interplay between them) including housing quality, economic wellbeing, employment, lifestyle, heredity factors, cultural and environmental factors. • Health problems associated with	**+**	The construction, operation, decommissioning and closure of geological disposal infrastructure, and particularly surface facilities, could have a wide range of potential impacts on human health. Effects such as changes in noise levels, visual amenity and air quality could affect sensitive members of the community (those with respiratory illnesses living adjacent to principal traffic routes, for example) and could influence levels of physical activity (as changes in land use could alter people's enjoyment or use of local recreational and amenity facilities and resources). It is assumed that such wider health issues will be effectively controlled by regulation of discharges, emissions and

Topic	Key Baseline Information and Issues	Likely Significance	Summary
	radiological exposure are generally a minor issue in the UK; the great majority of the average public dose comes from natural sources of radiation.		noise. Health and safety of local workforce and surrounding communities are stringently regulated under existing statutory controls and operator management systems. The inclusion of health in the draft NPS will ensure that human health is a material consideration in the determination of geological disposal infrastructure applications. Further, guidance in the draft NPS will ensure that consideration is given to the broader determinants of health which should, where adversely affected, be subject to mitigation. Any discharges of radiation from a GDF would be far below public dose limits and background radiation. Any potential radiological impacts on the health of workers and the public associated with a GDF would be subject to separate regulatory frameworks administered by the Office for Nuclear Regulation and the Environment Agency (or relevant environment agency) and are therefore separate from the planning process. However, by helping to ensure that long-term provision is made for the management of waste in the inventory for disposal, the draft NPS will indirectly minimise any risks or consequences arising from the current interim storage of higher activity wastes and which could impact on human health. Overall, when considering the cumulative, secondary or synergistic effects on human health, the draft NPS is considered to provide a strong framework to guide decisions on geological disposal infrastructure and has therefore been assessed as having a positive effect on this AoS objective.
4. Soil (including geology and land use)	• Approximately 1.6% of the land in the UK has been affected by contamination from industrial activity, although this is being addressed as sites are redeveloped. • Soils in England continue to be affected by human actions including intensive agriculture, historic levels of	**+/?**	The construction and operation of geological disposal infrastructure, and particularly surface facilities, could affect existing land uses due to land take associated with new development. This may result in clearance of vegetation and loss of soil levels leading to the loss of soil function and processes. It could also lead to disruption to agricultural drainage, water supply and access systems. Land-take effects of the GDF related nationally significant infrastructure projects would be long term, generally lasting at least until the end of the closure phase. It should also be noted that if sites were located on

Topic	Key Baseline Information and Issues	Likely Significance	Summary
	industrial pollution and urban development, making them vulnerable to erosion (by wind and water), compaction and loss of organic matter. • There is currently increasing pressure on rural and agricultural land from developers as urban areas expand. • As the climate (including temperature and rainfall patterns) changes in the future, it is likely that soils have the potential to be further degraded, as a result of both the direct and indirect impacts of climate change.		land that is of high agricultural quality, in other sensitive areas or where full site restoration is inhibited, then effects could be more significant. Reflecting existing national planning policy contained in the NPPF and the potential range of impacts outlined above, the draft NPS requires applicants to assess, and the Secretary State to consider, a range of impacts on land use, geology and soils. Mitigation is proposed in the draft NPS; however, as the detailed appraisal contained in **Appendix B** and **C** notes, the cumulative effects on soils could be further mitigated through a range of measures including a Soils Management Plan. By helping to ensure that long-term provision is made for the management of waste in the inventory for disposal, land currently associated with the storage of intermediate level waste will be released for reuse and in consequence, there may be indirect beneficial effects in respect of land use. Overall, the cumulative effects of the draft NPS on this objective are considered to be positive; however, some uncertainty remains as the draft NPS does not prevent development that would have adverse effects on, for example, the best and most versatile agricultural land or geological sites. There are also some residual uncertainties arising from whether additional mitigation measures will be employed.
5. Water Quality (including surface and ground water quality and availability)	• Coastal, estuarine and river water quality has improved since 1990. • There is growing pressure on water resources in parts of the UK, particularly the south east and east of England. • Climate change is expected to have significant impacts on the water environment. • There is a need to ensure that there is sufficient water infrastructure in place	**+**	The development of geological disposal infrastructure is likely to require substantial volumes of water, particularly during the construction phase. The cumulative effects of this demand for water resources in conjunction with any growing population demand, particularly in water scarce areas, could be locally significant for any affected communities. It is also noted that the siting, construction, operation and closure of a GDF and associated development, and particularly surface facilities, may also have adverse effects on water quality (through any accidental discharges or runoff from the construction of the surface facilities). The draft NPS requires that potential impacts on water quality and resources are identified, assessed and, where necessary, mitigated. Due regard is also required of the relevant River Basin Management

Topic	Key Baseline Information and Issues	Likely Significance	Summary
	to accommodate future growth in the UK.		Plans and the requirements of the Water Framework Directive (2000/60/EC) (including Article 4.7) and its daughter directives. This is expected to help minimise water requirements and waste water production and protect surface, groundwater, estuarine and coastal water quality. Detailed design measures will then be addressed through the DCO application process. Overall, the cumulative effects of the draft NPS on this objective are considered to be positive.
6. Flood Risk and Coastal Change	• Some 15% of UK properties are at risk from flooding (surface water, river or coastal), although the degree of risk varies. • Sea levels are rising, with worst case scenarios of a 1.9m increase in sea level by 2100 (with up to 0.76m more likely). The south and east of England will experience the greatest effective increases. • Many coastal sites (especially in the south and east of the England) are already prone to erosion, due to their underlying geology, coupled with rising sea levels and increased storm intensity.	+	Geological disposal infrastructure at the surface could be affected by flooding and coastal change, particularly if inappropriately sited. The development of surface facilities may also increase flood risk due to, for example, an increase in surface water runoff associated with impermeable areas of development and the siltation of local water courses. These impacts could be accentuated over the lifetime of a GDF due to the effects of climate change and will need to be considered in detail if a coastal site is preferred for any GDF related nationally significant infrastructure projects. Reflecting the NPPF, the draft NPS requires that applications for development consent are supported by a FRA and that the sequential test is adopted when assessing flood risk. It also gives priority to appropriate mitigation. In consequence, the draft NPS is expected to help ensure that full and appropriate consideration is given to flood risk in siting and consenting decisions and that appropriate mitigation is implemented. Overall, the cumulative effects of the draft NPS on this objective are considered to be positive.
7. Air Quality	• Air quality has improved in the UK over the last sixty years. • Localised poor air quality is generally associated with urban/industrial areas and major road infrastructure. • A relatively large number of Air Quality	+	The development of geological disposal infrastructure will result in emissions to air which could lead to adverse impacts on human health as well as on biodiversity and soils. The draft NPS requires that the Secretary of State gives substantial weight to air quality issues and states that consent can be refused where there would be significant impacts on air quality that contravene the Air Quality Directive (2008/50/EC). The draft NPS also requires the Examining Authority to consider

Topic	Key Baseline Information and Issues	Likely Significance	Summary
	Management Areas are located in urban areas, many of which have been designated due to high NO_2 and PM_{10} levels.		possible sources of nuisance, including smoke, fumes or gases, and how they may be mitigated or limited so as not to adversely affect air quality. Application of the draft NPS is therefore likely to result in positive effects in respect of minimising emissions of pollutant gases and particulates and enhancing air quality. In consequence, the draft NPS provides a strong policy framework to ensure that any significant cumulative adverse impacts on air quality arising from the development of geological disposal infrastructure are avoided and/or mitigated. As a result, the cumulative effects of the draft NPS on this objective are considered to be positive.
8. Noise	• Ambient noise levels are gradually rising in the UK as a result of an increasing - and increasingly mobile - population. • Road traffic is a dominant source of noise.	**+**	The development of geological disposal infrastructure, particularly surface facilities, will generate noise which could lead to adverse impacts on sensitive receptors such as residential properties and habitats. The cumulative impacts of noise on sensitive groups in local communities may create or exacerbate existing health issues. The draft NPS requires the identification and assessment of noise impacts through a noise assessment. It also requires the effective mitigation of noise impacts through measures including design, noise containment, barriers and landscaping. The draft NPS states that the Secretary of State should not grant consent unless satisfied that the proposal will mitigate and minimise adverse impacts on health and quality of life. Overall, the cumulative effects of the draft NPS on this objective are considered to be positive. The draft NPS will help to minimise noise and vibration effects from geological disposal infrastructure construction and operational activities, notably on sensitive locations and receptors.
9. Climatic Factors (including climate change and adaptation	• Greenhouse gases (e.g. CO_2, CH_4, N_2O, O_3) resulting from fossil fuel usage,	**+**	The construction, operation, decommissioning and closure of geological disposal infrastructure will generate greenhouse gas emissions which would

Topic	Key Baseline Information and Issues	Likely Significance	Summary
and flood risk)	agriculture and other land use have been linked with atmospheric warming and climate change. • The UK's Climate Projections (UKCP09) show that the UK as a whole is likely to experience hotter, drier summers, warmer, wetter winters and rising sea levels, particularly in the south east of England. This is likely to have a significant effect on a range of environmental conditions, including the water environment. • Sensitive ecosystems and UK water resources are likely to come under increasing pressure as a result of climate change.		contribute to climate change. A carbon footprint study[65] has quantified carbon emissions associated with the development of a GDF. It estimates that maximum emissions, including embodied carbon, of around 7.3 million tonnes of CO_2 would be generated over the lifetime of a GDF (a period of more than a century). The draft NPS seeks to ensure that the carbon impacts of development are assessed by the applicant and appropriate mitigation measures implemented. The draft NPS makes clear that applicants must consider the impacts of climate change when planning the location, design, build, operation and decommissioning and final closure of a GDF (in this regard, climate change adaptation is included as one of the six assessment principles of the draft NPS). It provides that the Secretary of State can refuse development consent if the applicant has failed to show they have considered the impact of climate change over the lifetime of the proposed development. The draft NPS seeks to minimise the carbon footprint of development as a contribution to climate change and ensure resilience to any consequences of climate change. It also promotes climate change adaptation as part of the design of the development, including rising temperatures and more extreme weather events. By helping to ensure that long-term provision is made for the management of waste in the inventory for disposal, the draft NPS will indirectly support the future nuclear energy industry and the generation of low carbon new nuclear power. Overall, the cumulative effects of the draft NPS on this objective are considered to be positive. It is anticipated that the draft NPS will help to promote a low carbon design solution which will also address climate change adaptation and resilience.
10. Waste and Resources	• The total amount of municipal and commercial and industrial waste produced each year	**+**	The development of geological disposal infrastructure will require significant volumes of resources including concrete and steel as well as natural resources such as water. During the lifetime of a GDF,

[65] Radioactive Waste Management Ltd (2016) 'Geological Disposal Generic Carbon Footprint Analysis', Technical Note no. 27754118, available online at: https://rwm.nda.gov.uk/publication/geological-disposal-generic-carbon-footprint-analysis/

Topic	Key Baseline Information and Issues	Likely Significance	Summary
	is likely to decrease in coming years. • The consumption of non-renewable sources will deplete overall stocks and result in a scarcity of resources for future generations. • Facilities for disposing of higher activity wastes, which include low level waste not suitable for near-surface disposal, intermediate level waste and high level waste, have yet to be developed in the UK.		and particularly during construction, large quantities of waste will also be generated. For example, the Radioactive Waste Management Ltd (2016) Geological Disposal: Generic Environmental Assessment Report estimates that the following quantities of excavated materials could be generated over the lifetime of the project (using the upper inventory of Higher Activity Radioactive Waste (HAW) to be disposed of, although these estimates will be affected in particular by updates to the inventory for disposal): • higher strength rock – 10.80 million cubic metres; • lower strength sedimentary rock – 8.83 million cubic metres; and • evaporite rock – 6.52 million cubic metres. If none of the surplus excavated rock could be re-used on or off-site for another purpose this would result in a significant waste stream. The draft NPS promotes good design as an integral consideration from the outset and which is expected to help encourage the sustainable use of natural resources. However, additional mitigation measures may be needed to help address the beneficial re-use of any surplus excavated rock. The draft NPS will support the delivery of a GDF in a timely manner thereby helping to ensure the safe and secure management of the UK's higher activity radioactive waste in the long term. Overall, the cumulative effects of the draft NPS on this objective are considered to be positive as the draft NPS will help to ensure the sustainable use of resources and management of waste arisings associated with geological disposal infrastructure. The cumulative effects could be enhanced through the inclusion of additional mitigation measures in the draft NPS.
11. Traffic and Transport	• Increasing levels of congestion are being experienced on the UK's road network. • There is a need for investment in transportation infrastructure to meet future demand and	**+**	The development of geological disposal infrastructure will result in significant vehicle movements, particularly during the construction phase. These movements, in conjunction with existing traffic movements, could have cumulative effects on the surrounding transport infrastructure and increase the potential for congestion on the local road network. The

Topic	Key Baseline Information and Issues	Likely Significance	Summary
	support economic growth. • There is a need to reduce the need to travel and facilitate a shift towards more sustainable modes of transport.		transportation of radiological materials by road and rail in the UK is controlled by the Office for Nuclear Regulation and the Department for Transport and any movements associated with a GDF would be small. The draft NPS requires that, where a proposed development is likely to have significant transport implications, the applicant prepares a transport assessment and a travel plan to mitigate impacts. The draft NPS states that the Secretary of State must ensure that significant impacts are mitigated during both the construction and operation phases. Mitigation measures, where required, must have regard for demand management measures whilst also ensuring that cost-effectiveness is considered. Where substantial impacts cannot be reduced, applicants may enter into planning obligations for funding additional infrastructure. Application of the draft NPS is likely to result in a positive effect in respect of minimising traffic volumes and promoting sustainable transport choices. The draft NPS also seeks to maximise the use of rail and water-borne transport as far as possible for the movement of bulk materials in order to minimise the use of HGV traffic and any adverse effects this may have on traffic and transport. In consequence, the cumulative effects of the draft NPS on this objective are considered to be positive as the draft NPS could help to minimise direct effects with respect to traffic and transport.
12. Cultural Heritage	• Scheduled monuments in rural areas are at risk from agricultural practices, land disturbance and unrestricted plant, scrub or tree growth. • The settings of heritage assets are at risk from new development.	**+**	The development of geological disposal infrastructure, and particularly surface facilities, could have a range of impacts on the significance of cultural heritage assets. The draft NPS requires applicants to assess the likely effects of geological disposal infrastructure on cultural heritage assets and to ensure that impacts in this regard are taken into account. Where cultural heritage interests are affected, the draft NPS provides for the application of clear mitigation measures, addressing direct and indirect effects, which should result in positive effects. Overall, the cumulative effects of the draft NPS on this objective are considered to be positive.

Topic	Key Baseline Information and Issues	Likely Significance	Summary
13. Landscape and Townscape	• Some 10% of the UK is covered by National Parks, with other designations extending the area of landscape covered by a further 15%. • Natural England reported that in 2008, existing landscape character was being maintained in 51% of England's landscapes, whilst in a further 10%, existing character was being enhanced. For 19% of areas, new landscape characteristics were emerging, whilst the remaining 20% showed some signs of neglect. • Key issues that could affect landscape could include the effects of climate change, changes to agricultural practices, new energy infrastructure and development pressures. • Light pollution appears to have increased considerably over the last 30-40 years over much of the UK.	**+/?**	The development of geological disposal infrastructure, and particularly surface facilities, could have a range of impacts on landscapes and townscapes including (but not limited to) the loss or fragmentation of, or damage to, landscape features and changes in overall landscape character. The draft NPS provides clear guidance on how landscape and visual impacts should be taken into account by applicants and on the use of appropriate mitigation measures such as design and landscaping to address adverse landscape and visual impacts. The draft NPS makes clear that the Secretary of State should give 'great weight' to conserving nationally significant landscapes, although development may be allowed in exceptional circumstances and where it can be demonstrated that it is in the public interest. As such, there could be a degree of uncertainty as to the likely outcomes (in terms of effects on the landscape) as a result of the decision making. Overall, the cumulative effects of the draft NPS on this objective are considered to be positive. This reflects the application of mitigation measures addressing direct effects; however, there are some uncertainties arising from the outcome of a decision that balances landscape impacts and nationally significant infrastructure project benefits.

5.177. Potential cumulative effects could also be associated with the interaction of the draft NPS with other national plans and programmes. The non-location specific nature of the draft NPS, however, limits the extent to which such effects can be considered in detail and, given the positive effects identified for the draft NPS, it appears unlikely that the interactions between the draft NPS and any other plans or programmes will, in themselves, give rise to cumulative negative effects. Those other NPSs where there is clear commonality in terms of sectors and objectives are:

- Overarching NPS for Energy (EN1) (2011); and
- NPS for Nuclear Power Generation (EN6) (2011).

5.178. **Table 5.18** provides a summary of the cumulative effects of the draft NPS in combination with the other energy related NPSs above.

Table 5.18 Summary of cumulative effects of the draft NPS with other relevant energy NPSs

NPS	Likely Effect on…	Likely Significance	**Comment**
Overarching NPS for Energy (EN1) and NPS for Nuclear Power Generation (EN6)	Cumulative effects on all AoS objectives	**+/-**	The development of new energy related infrastructure anticipated by NPS EN1 and NPS EN6, when co-located with or in close proximity to GDF related nationally significant infrastructure project development anticipated by the draft NPS, could have a range of localised (and potentially more significant) impacts. These impacts could include: changes in water quality; increased water demand; land take; direct habitat and species loss; habitat fragmentation; emissions to air; greenhouse gas emissions; increased noise; waste creation; vehicle movements and effects on the wider transport network; effects on cultural heritage; and impacts on landscape. The construction and operation of nationally significant infrastructure projects would also have positive economic impacts such as job creation, spend in the local economy and investment in the supply chain. The cumulative effects of such development will need to be considered at the individual DCO application stage, with detailed consideration given to the scale, duration and phasing of such effects.
NPS for Nuclear Power Generation (EN6)	Cumulative effects on AoS objectives for waste and human health	**++**	There is legacy waste, including waste from over 60 years' nuclear generation, that is presently temporarily stored at over 30 sites in the UK and there is also a need for disposal of higher activity radioactive waste for new nuclear power stations that will be commissioned in the coming decades (and anticipated by NPS EN6). The draft NPS provides a clear framework for decisions relating to geological disposal infrastructure which will support the delivery of a GDF in a timely manner thereby helping to ensure the safe and secure management of the UK's higher activity radioactive waste in the long term. In consequence, for waste management and human health, the cumulative effects are considered to be significantly positive.

5.179. The NPS for Ports (2012) also provides the framework for the planning of significant development proposals, which could include the handling of radioactive waste for transfer to a GDF, and as such ensures a rounded consideration of similar environmental, social and economic factors considered within this AoS. Whilst the type and degree of impacts are likely to vary, the overall effects are likely to be similar.

5.180. Effects of the draft NPS in combination with other plans, programmes and proposals at a local/regional level (e.g. local planning authority land use plans and infrastructure

plans and projects) have not been considered in detail as part of this assessment. This reflects the inherent uncertainties with respect to the exact scale and location of future activities which would mean that any such assessment at this stage is likely to be high level, generic and too uncertain to be meaningful. It is, however, expected that cumulative effects in this regard would be considered at the individual project stage as part of the Environmental Impact Assessment process, once site location has been established.

6. Conclusions and monitoring

What are the sustainability effects of the draft NPS?

6.1. The likely significant environmental and socio-economic effects of implementing the draft NPS have been identified, described and evaluated in accordance with Section 5(3) of the Planning Act 2008 and in compliance with the requirements of the SEA Directive (2001/42/EC) and relevant implementing regulations.

6.2. Overall, the appraisal contained in this AoS Report has found that the implementation of the draft NPS is likely to have positive effects across all of the AoS objectives that have been used to help characterise the socio-economic and environmental effects of the draft NPS, although no significant positive effects are predicted to occur. This reflects the expectation that the policy and guidance for the nationally significant infrastructure project developer, the Examining Authority and the Secretary of State contained in the draft NPS will, alongside prevailing national planning policy, legislation and regulatory regimes, provide a positive framework that helps to ensure the potential adverse impacts of geological disposal infrastructure development are identified, appropriately assessed and, where necessary, avoided, minimised or mitigated.

6.3. Importantly, by providing a clear framework for decisions relating to geological disposal infrastructure, the draft NPS will support the delivery of a GDF in a timely manner. This will help to ensure the safe and secure management of the UK's higher activity radioactive waste in the long term.

6.4. No negative effects (significant or minor) on the AoS objectives have been identified during the appraisal of the draft NPS. However, opportunities have been highlighted to enhance the positive effects associated with the implementation of the draft NPS.

Comparison of the draft NPS and the reasonable alternatives

6.5. Two reasonable alternatives to the draft NPS have been identified and appraised as part of this AoS Report: 'draft NPS including exclusionary criteria' and 'no NPS'.

6.6. Effects on the AoS objectives associated with an alternative based on an NPS that includes exclusionary criteria would be broadly similar to those identified in respect of the draft NPS above. However, the setting of clear parameters for siting which exclude specific environmental and cultural assets would be likely to provide greater certainty (relative to the draft NPS as proposed) in respect of the location of geological disposal infrastructure, and would help to reduce the likelihood that adverse impacts on these assets could occur. In consequence, this reasonable alternative has been assessed as having a significant positive effect on those AoS objectives relating to biodiversity, air, noise, cultural heritage and landscape and townscape (the draft NPS as proposed has been assessed as having a positive effect on these AoS objectives).

6.7. Whilst this alternative would potentially result in positive effects across the AoS objectives that are of a greater magnitude than the proposed draft NPS, the adoption of exclusionary criteria may not necessarily exclude the possibility of adverse effects occurring (although the general risk of adverse effects is assumed to be reduced). In particular, adverse effects could still arise if geological disposal infrastructure were sited

adjacent or close to the boundary of a designated site or asset. In addition, the adoption of exclusionary criteria could result in unintended effects arising from increased development pressure on areas that, whilst not designated, may be sensitive to development (for example, areas at risk of flooding) or have value in terms of, for example, the economy or mineral resources.

6.8. Further, under this alternative the Government would be prejudging the suitability of some sites before all the facts are available thereby unduly restricting the siting of geological disposal infrastructure. This could reduce the potential scope for the provision of new infrastructure to serve nationally significant infrastructure projects in suitable and sustainable locations.

6.9. An alternative that would result in a NPS not being designated would mean that existing national planning policy would guide the development of any future geological disposal infrastructure for higher activity radioactive waste in England. Taking into account the existing legislative and regulatory framework that exists to manage environmental impacts, this alternative would be expected to have positive effects across the AoS objectives.

6.10. However, relative to an alternative that involves the designation of a NPS, there would be a higher degree of uncertainty due to the absence of a clear statement regarding the full range of considerations to be taken into account by the applicant and Secretary of State and opportunities for the mitigation of adverse impacts and enhancement of benefits may be missed. Importantly, under this alternative there would also be increased uncertainty with regard to the successful and timely delivery of a GDF which could have implications in respect of the safe and secure management of the UK's higher activity radioactive waste in the long term. In consequence, the alternative of not designating a NPS is considered to be the worst performing alternative.

Reasons for selecting the draft NPS and rejecting reasonable alternatives

Reasons for selecting the draft NPS

6.11. The draft NPS as proposed provides a clear and transparent policy framework in which planning decisions in respect of geological disposal infrastructure would take place. Once designated, the NPS will provide increased certainty to the developer, Examining Authority and Secretary of State that geological disposal infrastructure will be brought forward. It will help to ensure that the potential adverse impacts of geological disposal infrastructure development are identified, appropriately assessed and, where necessary, that such impacts are avoided, minimised or mitigated. It will also set out a clear decision making process, involving objective examination by the Planning Inspectorate, which recommends to the Secretary of State whether or not to grant development consent.

6.12. The Government considers that a non-site specific NPS does not anticipate the outcome of the separate siting process and provides a sufficiently flexible framework to ensure that geologically suitable sites can be selected to ensure the necessary safety and security in future geological disposal.

6.13. Overall, the designation of the draft NPS as proposed would ensure that planning decisions in respect of geological disposal infrastructure take into account the full range of environmental and socio-economic impacts associated with geological disposal

infrastructure development and that they are expedient, timely, predictable and accountable. This will ultimately support the UK Government's policy of geological disposal of higher activity radioactive waste. **In consequence, the draft NPS as proposed is being taken forward for consultation.**

Reasons for the rejection of reasonable alternatives

No NPS

6.14. Under this reasonable alternative, a NPS would not be designated. This would not prevent geological disposal infrastructure from coming forward (proposals could still be considered in the context of Council Directive 2011/70/Euratom, which broadly accepts that deep geological disposal represents the safest and most sustainable option as the end point of the management of high level waste) and planning decisions would be made in the context of the prevailing national planning policy and legislation. However, there would be increased uncertainty in respect of the successful and timely delivery of a GDF to ensure the safe and secure management of the UK's higher activity radioactive waste in the long term. **In consequence, the alternative of not designating a NPS has been rejected.**

Draft NPS including exclusionary criteria

6.15. A 'criteria based' NPS has also been considered as a reasonable alternative. Such criteria would be for the purpose of protecting the environment and may include, for example, excluding development at, under or adjacent to World Heritage Sites, National Parks, the Broads, AONBs or European designated conservation sites. Specifically excluding these areas would help to establish clearer parameters for decision making and could have significant positive effects on the environment by introducing heightened protection from the effects of geological disposal infrastructure to them.

6.16. Whilst noting the possible beneficial effects of adopting exclusionary criteria in respect of heritage, landscape and biodiversity, their use within the NPS could challenge the Government's ability to ensure that a GDF is sited in a geologically suitable environment. Geological considerations are critical to ensuring that there are effective barriers with no conceivable pathways from the facility to the surface. The Government does not wish to foreclose future possible locations that could be more advantageous in addressing safety over the lifetime of the facility.

6.17. Furthermore, the sensitivity of designated areas varies considerably and many of the potential effects of infrastructure developments can be mitigated by good design and planning. Given this, it may well be possible to develop infrastructure in these areas without an unacceptable environmental impact, as has occurred in some circumstances previously in National Parks and World Heritage Sites (and as described in **Section 2** of this AoS report). Exclusion of these areas could also reduce the scope of community engagement and unnecessarily exclude communities in these areas from the potential socio-economic benefits of hosting a GDF.

6.18. The planning process already provides protection for designated areas as described in Chapter 5 of the draft NPS; these issues will be examined at the site-specific stage when both the potential impacts and the effectiveness of their mitigation can best be judged. Therefore, broad exclusionary criteria are not necessary to achieve the goal of ensuring that the environment is suitably protected, as site-specific examination may show it is possible to develop infrastructure in these areas without an unacceptable impact on people or the environment. Furthermore, the Government wants to ensure

that the separate siting process has sufficient flexibility to identify the safest location for a GDF over the lifetime of the facility.

6.19. The Government considers that applying exclusionary criteria would risk prematurely excluding some areas from detailed consideration and, as a consequence, compromising the Government's ability to ensure that geological disposal infrastructure is sited in a geologically suitable environment to provide a long-term, secure, safe and sustainable solution for the disposal of higher activity radioactive waste. In addition, it may be possible to develop geological disposal infrastructure in designated areas without an unacceptable impact on people of the environment. Therefore, the Government will not be applying exclusionary criteria to the NPS; **in consequence, the reasonable alternative of a draft NPS that includes exclusionary criteria has been rejected.**

Proposals for monitoring

6.20. It is a requirement of the SEA Directive to establish how the significant effects of implementing the draft NPS will be monitored. As set out in Government Guidance[66], "it is not necessary to monitor everything or monitor an effect indefinitely. Instead, monitoring needs to be focused on significant sustainability effects".

6.21. Monitoring should therefore be focused on:

- the significant effects identified in the appraisal that may give rise to irreversible damage, with a view to identifying trends and where appropriate to implement relevant mitigating measures before such damage is caused; and
- uncertain effects where monitoring would enable preventative or mitigating measures to be undertaken.

6.22. Article 10(2) of the SEA Directive specifically states that, where appropriate, existing monitoring arrangements may be used to assess the success of the appropriate plan in achieving its objectives. It does not require that targets be developed for the SEA itself.

6.23. As set out above, the appraisal contained in this AoS Report has found that the implementation of the draft NPS is likely to have positive effects across all of the AoS objectives. No significant positive or significant negative effects have been identified. Despite this, monitoring the socio-economic and environmental effects of the implementation of the draft NPS can help to answer questions such as:

- Were the AoS predictions of effects accurate?
- Is the NPS contributing to the achievement of the AoS objectives?
- Are mitigation measures performing as well as expected?
- Are there any unforeseen adverse effects? Are these within acceptable limits, or is remedial action desirable?

The need for ongoing monitoring is particularly pertinent given the uncertainties identified in **Section 4** of this report.

[66] ODPM (now DCLG) (2005) 'A Practical Guide to the Strategic Environmental Assessment Directive, available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/7657/practicalguidesea.pdf

6.24. For the 13 topics considered in this AoS, it is therefore proposed that monitoring should focus on the indicators and sources of information set out in **Table 6.1**.

Table 6.1 Potential monitoring indicators

Topic Area	Potential Indicator(s)	Possible Source(s) of Information
Biodiversity and Nature Conservation	Annual (where information allows) trends in: • condition of designated sites; • threatened habitats and species; • populations of countryside birds; and • surface water biological indicators in locations at or adjacent to deep borehole and GDF development sites. Implementation of construction management plans. Implementation of biodiversity enhancement measures.	Joint Nature Conservation Committee Department for Environment, Food and Rural Affairs (Defra) Environment Agency Natural England Natural Resources Wales Scottish Natural Heritage Developer
Population, Economics and Skills	Annual (where information allows) trends in: • number of construction workers employed at geological disposal infrastructure sites; • employment activity and unemployment rates in locations hosting geological disposal infrastructure; • business counts in locations hosting geological disposal infrastructure; • local jobs creation associated with the development of geological disposal infrastructure; • training and apprenticeship opportunities generated by geological disposal infrastructure development; • Gross Value Added (GVA)[67] associated with construction and operation of geological disposal infrastructure; • investment in local community facilities and services associated with geological disposal infrastructure; and • deprivation at locations hosting geological disposal infrastructure.	Developer Office for National Statistics
Human Health	Annual (where information allows) trends in: • monitoring of noise levels at development sites and along transport routes to/from the deep borehole and GDF construction site(s); • number of nuisance complaints received related to GDF activity; • air quality at development sites and along key	Developer Local Planning Authority Public Health England Office for National Statistics

[67] GVA is the measure of the value of goods and services produced in an area, industry or sector of an economy.

Topic Area	Potential Indicator(s)	Possible Source(s) of Information
	transport routes from/to the deep borehole and GDF construction site(s); • GDF worker accidents; and • health deprivation and inequalities at locations hosting geological disposal infrastructure. Implementation of construction management plans at deep borehole and GDF construction sites.	
Land Use, Geology and Soils	Annual (where information allows) trends in: • loss of best and most versatile agricultural land as result of the development of geological disposal infrastructure; • area of vegetation and soil layers cleared to support geological disposal infrastructure; • remediation of contaminated land in support of geological disposal infrastructure; • incidences of land contamination at geological disposal infrastructure sites; and • condition of Geological Conservation Review sites in locations adjacent to geological disposal infrastructure. Implementation of construction management plans at deep boreholes and GDF construction sites.	Developer Local Planning Authority Natural England
Water Quality (including surface and ground water quality and availability)	Annual (where information allows) trends in: • groundwater quality monitoring; • surface water quality monitoring; • volumes of water consumption; and • consented/permitted discharges at GDF development sites and linked waterbodies.	Developer Environment Agency Natural Resources Wales Scottish Environment Protection Agency Relevant water companies
Flood Risk and Coastal Change	Annual (where information allows) trends in: • the extent of geological disposal infrastructure in Flood Zones 2 and 3[68]; • flood risk adjacent to geological disposal infrastructure sites; • incidents of flooding affecting geological disposal infrastructure; and • investment in flood risk defences associated with geological disposal infrastructure development.	Developer Environment Agency Local Planning Authority
Air	Annual (where information allows) trends in: • air quality monitoring (including nitrogen	Developer

[68] Land identified by the Environment Agency as having either a medium or high probability of flooding. Flood Zone 2 defined as land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. Flood Zone 3 defined as Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding.

Topic Area	Potential Indicator(s)	Possible Source(s) of Information
	oxides (NOx), hydrocarbons, carbon monoxide (CO), particulate matter (PM), methane, sulphur dioxide (SO2), radon, volatile organic compounds (VOCs) and ozone) at GDF development sites and along key transport routes to/from the deep borehole and GDF construction site(s); and • traffic activity levels around GDF development sites (annual average daily traffic flows). Implementation of construction management plans at deep borehole and GDF construction sites.	Local Planning Authority Public Health England
Noise	Annual (where information allows) trends in: • monitoring of noise levels at GDF development sites and along transport routes from/to the deep borehole and GDF construction site(s); and • number of nuisance complaints received related to GDF activity. Implementation of construction management plans at deep borehole and GDF construction site(s).	Developer Local Planning Authority
Climatic Factors	Annual (where information allows) trends in: • energy consumption associated with the development of geological disposal infrastructure; and • emissions of greenhouse gases associated with geological disposal infrastructure development.	Developer
Waste and Resources	Annual (where information allows) trends in: • volume of construction waste and proportions recycled; • volume of hazardous waste; • volume of controlled wastes and proportions recycled; • volumes of wastewater; and • raw materials used associated with deep borehole and GDF development. Annual (where information allows) trends in volumes of higher activity radioactive waste deposited in a GDF. Implementation of Site Waste Management Plans.	Developer Environment Agency Relevant Waste Planning Authorities
Traffic and Transport	Annual (where information allows) trends in: • traffic activity levels around GDF development sites (annual average daily traffic flows); • proportion of GDF workers using sustainable modes of transport; and • investment in transportation infrastructure and public transport services associated with	Developer Highways Authority

Topic Area	Potential Indicator(s)	Possible Source(s) of Information
	geological disposal infrastructure. Implementation of GDF Staff Travel Plans.	
Cultural Heritage	Annual (where information allows) trends in: • % of heritage assets of different types that are at risk at or adjacent to geological disposal infrastructure development sites; • loss of, or damage to, heritage assets and their settings as a result of GDF development; and • the impact of GDF development on the significance of historic assets in locations at or adjacent to geological disposal infrastructure development sites.	Historic England Cadw (Welsh Government historic environment service) Historic Environment Scotland Local Planning Authority
Landscape and Townscape	Annual (where information allows) trends in development of geological disposal infrastructure in National Parks and Areas of Outstanding Natural Beauty (AONBs). Implementation of landscape enhancement measures as part of geological disposal infrastructure development.	Developer Local Planning Authority (including National Park authorities)

6.25. Further information and specific details about the monitoring proposals for the effects of the draft NPS, including the frequency of monitoring, reporting and responsibilities, will be presented in the Post Adoption Statement, taking into account comments received during consultation on the draft NPS and this AoS Report.

Next steps

6.26. This AoS Report is presented for consultation. Feedback received from consultees will be documented and considered in reviewing the proposals for the draft NPS. A Post Adoption Statement will summarise how the AoS and the consultation responses have been taken into account and how socio-economic and environmental considerations have been integrated into the final decisions regarding the NPS.

Glossary and abbreviations

Term	Definition
ALARP	As Low As Reasonably Practicable. This involves weighing a risk against the trouble, time and money needed to control it. Thus, ALARP describes the level to which see workplace risks should be controlled.
AONB	Area of Outstanding Natural Beauty. An area of countryside considered to have significant landscape value.
AoS	Appraisal of Sustainability. An assessment of a National Policy Statement required by the Planning Act 2008 before a National Policy Statement can be designated. It identifies, describes and evaluates the likely environmental and socio-economic effects of the National Policy Statement. If potential significant adverse effects are identified, the Appraisal of Sustainability recommends options for avoiding or mitigating such effects.
AQMA	Air Quality Management Area. These are areas which have been identified by local authorities as unlikely to reach national air quality objectives.
BAT	Best Available Technique. BATs are required to be considered (under EC Directive 96/61) in order to avoid or reduce emissions resulting from certain installations and to reduce the impact on the environment as a whole.
BEIS	Department for Business, Energy and Industrial Strategy. The department brings together responsibilities for business, industrial strategy, science, innovation, energy, and climate change.
Becquerel (Bq)	The standard international unit of radioactivity equal to one radioactive decay per second. Multiples of Becquerel used to define radioactivity include the Gigabecquerel (GBq) equal to 1,000,000,000Bq.
Cadw	Cadw is the Welsh Government's historic environment service.
CEMP	Construction Environment Management Plan. A Plan which details management measures to adopt and implement during construction activities to avoid and manage construction effects on the environment and surrounding communities.
CFMP	Catchment Flood Management Plan. A plan that considers and looks to address all types of inland flooding, from rivers, groundwater, surface water and tidal flooding.

Term	Definition
CO	Carbon monoxide (a colourless, odourless and toxic gas).
CO_2	Carbon dioxide. A naturally occurring gas, also a by-product of burning fossil fuels and other industrial processes. It is the principal anthropogenic greenhouse gas that affects the Earth's radiative balance.
COMAH	The Control of Major Accident Hazards (COMAH) Regulations 2015. The purpose of the COMAH Regulations is to prevent major accidents involving dangerous substances and limit the consequences to people and the environment of any accidents which do occur. The COMAH Regulations 2015 implement the majority of the Seveso III Directive (2012/18/EU) in Great Britain (Northern Ireland produces its own regulations). The land-use planning requirements from the Directive are implemented through planning legislation. These Regulations replace the 1999 Regulations
CoRWM	Committee on Radioactive Waste Management (CoRWM). CoRWM provides independent scrutiny and advice to the UK governments on the long-term management of higher activity radioactive waste. CoRWM is an an advisory non-departmental public body, sponsored by the Department for Business, Energy and Industrial Strategy.
Cumulative effects	Effects that occur where several individual activities which each may have an insignificant effect, combine to have a significant effect.
DCLG	Department for Communities and Local Government. The UK government department responsible for building regulations, community cohesion, fire services and community resilience, housing, local government, planning, race equality and urban regeneration.
DCO	Development Consent Order. A consent by a Minister for a nationally significant infrastructure project. This replaces a range of other consents, such as planning permission and listed building consent.
Defra	Department for Environment, Food and Rural Affairs. The UK government department responsible for safeguarding the natural environment, supporting the food and farming industry, and sustaining the rural economy.
EA	Environment Agency. The environmental regulator for England. The Agency's role is the enforcement of specified laws and regulations aimed at protecting the environment, in the context of sustainable development, predominantly by authorising and controlling radioactive discharges and waste disposal to air, water and land. The Environment Agency also regulates nuclear sites under the Environmental Permitting Regulations and issues

Term	Definition
	consents for non-radioactive discharges.
EIA Directive	Environmental Impact Assessment Directive, which covers the Directive 2014/52/EU which amended Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment which itself updated the original Directive (85/337/EEC).
EMP	Environmental Management Plan. This is a document that sets out the required measures to manage the environmental effects of development and to demonstrate compliance with relevant legislation.
EPR16	Environmental Permitting (England and Wales) Regulations 2016. These regulations provide a consolidated system of environmental permitting for activities in England and Wales, including the disposal of radioactive waste.
ES	Environmental Statement. An Environmental Statement forms part of the Environmental Impact Assessment (EIA) process required by Directive 2011/92/EU and UK implementing regulations. The ES must include at least the information reasonably required to assess the likely significant environmental effects of a development. The ES is submitted with an application for development consent.
European site	European sites include Sites of Community Importance (SCIs), Special Areas of Conservation (SACs), candidate Special Areas of Conservation (cSACs) and Special Protection Areas (SPAs). 'European site' is defined in regulation 8 of the Conservation of Habitats and Species Regulations 2017.
FTE	Full Time Equivalent. This is a unit to measure employed persons in a way that makes them comparable although they may work a different number of hours per week. It is obtained by comparing an employee's average number of hours worked to the average number of hours of a full-time worker.
GDF	A geological disposal facility is a highly-engineered facility capable of isolating radioactive waste within multiple protective barriers, deep underground, to ensure that no harmful quantities of radioactivity ever reach the surface environment. The development of a geological disposal facility will be a major infrastructure project of national significance.
GHG	Greenhouse gases. These gases absorb and emit radiation at specific wavelengths within the spectrum of thermal infrared radiation emitted by the Earth's surface, the atmosphere itself, and by clouds. This property causes the greenhouse effect.
GWD	The Groundwater Directive. Directive 2006/118/EC on the protection of groundwater against pollution and deterioration.

Term	Definition
Ha	Hectare; a metric unit of area defined as 10,000 square metres.
HAW	Higher Activity Waste includes high level waste (HLW), intermediate level waste (ILW) and some low level waste (LLW) that is unsuitable for disposal in the Low Level Waste Repository (LLWR). HAW arises from activities such as: reactor operation, reprocessing of spent nuclear fuel and decommissioning.
HLW	High level waste. This is waste in which the temperature may rise significantly as a result of its radioactivity, so this factor has to be taken into account in the design of storage or disposal facilities.
HGV	Heavy Goods Vehicle. A heavy goods vehicle (HGV) is the term for any truck with a gross combination mass (GCM) of over 3.5 tonnes.
HRA	Habitats Regulations Assessment. This is an assessment of whether a draft plan or project is likely to have a significant effects on any European sites (either alone or 'in combination' with other plans or projects); and, if so, whether these effects will result in any adverse effects on that site's integrity with reference to the site's conservation objectives. This is undertaken in accordance with the Conservation of Habitats and Species Regulations 2017 and Directive 92/43/EEC (the 'Habitats Directive').
Induced seismicity	Earthquake and tremor activity caused by human activity.
IED	Industrial Emissions Directive. Directive 2010/75/EU on industrial emissions (integrated pollution prevention and control).
IAEA	International Atomic Energy Agency (IAEA). The IAEA is the international centre for cooperation in the nuclear field. The Agency works with its Member States and multiple partners worldwide to promote the safe, secure and peaceful use of nuclear technologies.
ILW	Intermediate level waste. This is waste exceeding the upper boundaries for LLW that do not generate sufficient heat for this to be taken into account in the design of storage or disposal facilities.
IPPCD	Integrated Pollution Prevention and Control Directive. Directive 2008/1/EC concerning integrated pollution prevention and control. In 2010, following a review, it was integrated with 6 other European directives regulating large industrial sites into the Industrial Emissions Directive (2010/75/EU).
LLW	Low level waste. This is waste having a radioactive content not exceeding 4 Gigabecquerels per tonne of alpha activity, or 12 Gigabecquerels per tonne of beta/gamma activity.

Term	Definition
LLWR	Low Level Waste Repository. The UK national facility for the near surface disposal of solid Low Level Waste, located near to the village of Drigg in Cumbria.
ML	Megalitre; a unit of volume defined as a million litres.
MWD	Mining Waste Directive. Directive 2006/21/EC on the management of waste from extractive industries and amending Directive 2004/35/EC.
Mt CO_2 eq	Millions of tonnes of carbon dioxide equivalent. This is a metric measure used to compare the emissions from various greenhouse gases on the basis of their global warming potential by converting amounts of other gases to the equivalent amount of carbon dioxide with the same global warming potential.
NIA65	Nuclear Installations Act 1965. The main act of Parliament that relates to nuclear installations. A GDF will be a nuclear installation under the Act.
N2K (Natura 2000) sites	Natura 2000 is a network of nature protection areas in the territory of the European Union. It is made up of Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) designated respectively under the Habitats Directive and Birds Directive. The network includes both terrestrial and marine sites (Marine Protected Areas (MPAs)).
NPPF	National Planning Policy Framework. The framework published by DCLG in 2012 sets out the Government's planning policies for England and how these are expected to be applied.
NRW	Natural Resources Wales. The environmental regulator in Wales. It was created in 2013 with a mission to ensure that the environment and natural resources of Wales are sustainably maintained, enhanced, and used, now and in the future. Its regulatory responsibilities includes the regulation of the disposal of radioactive waste from nuclear sites, as well as other premises in Wales. All permits relating to sites generating or disposing of radioactive waste in Wales are issued by Natural Resources Wales. Compliance with these permits at nuclear sites is currently carried out by the Environment Agency specialists on behalf of Natural Resources Wales, but enforcement is undertaken directly by Natural Resources Wales.
NTS	Non-Technical Summary. Summarises the findings of this AoS.
NORM	Natural Occurring Radioactive Material. Material that contains radioactive elements of natural origin. NORM primarily contains uranium and thorium (elements that also release radium and radon gas once they begin to decay) and potassium.
RIGS	Regionally important geological and geomorphological sites (RIGS). The sites are locally designated sites of local, national

Term	Definition
	and regional importance for geodiversity (geology and geomorphology) in the United Kingdom.
RWM	Radioactive Waste Management Limited. It is a wholly-owned subsidiary of the Nuclear Decommissioning Authority (NDA), which is an Executive Non-Departmental Public Body of the Department for Business, Energy and Industrial Strategy (BEIS). RWM is leading the delivery of geological disposal.
NOx	Nitrogen oxides. NOx is the generic term for a group of highly reactive gases, all of which contain nitrogen and oxygen in varying amounts.
NSIP	Nationally significant infrastructure projects. These are large scale developments that require development consent under the Planning Act 2008.
NVC	National Vegetation Classification. NVC is a common standard developed for nature conservation agencies which provides classification and description of the plant communities of Britain.
OECD	Organisation for Economic Co-operation and Development. An intergovernmental economic organisation with 35 member countries, founded in 1960 to stimulate economic progress and world trade.
ONR	The Office for Nuclear Regulation. The Office for Nuclear Regulation independently regulates nuclear safety and security at 36 nuclear licensed sites in Great Britain. It also regulates the transport of radioactive materials and plays a key role in ensuring that the UK's safeguards obligations are met.
ONS	Office for National Statistics (ONS). The UK's largest independent producer of official statistics and its recognised national statistical institute. The ONS is responsible for collecting and publishing statistics related to the economy, population and society at national, regional and local levels. The ONS also conducts the census in England and Wales every 10 years.
PPW	Planning Policy Wales. PPWs provides the land use planning policy for Wales. It is supplemented by a series of Technical Advice Notes (TANs) and Minerals Technical Advice Notes (MTANs).
Ramsar	Ramsar sites are wetlands of international importance, designated under the Ramsar Convention (first signed in 1971).
SAC	Special Areas of Conservation are strictly protected sites designated under the EC Habitats Directive.

Term	Definition
SEA	Strategic Environmental Assessment. An iterative process for gathering information and evidence, assessing effects, developing mitigation and enhancement measures and making recommendations to refine a plan or programme in view of its predicted environmental effects. It is a statutory requirement for certain plans and programmes under the Strategic Environmental Assessment (SEA) Directive (Directive 2001/42/EC) and UK Strategic Environmental Assessment (SEA) Regulations (SI 2004/1633, SI 2004/1656, SR 2004/280).
SEA Directive	Strategic Environmental Impact Assessment Directive. Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment.
Secondary effects	Effects that do not occur as a direct result of a plan or activity, but occur at distance from the direct impacts or as a result of a complex pathway.
SEPA	Scottish Environment Protection Agency. The environmental regulator for Scotland. Responsibilities include operating the Scottish aspect of the Radioactive Incident Monitoring Network and work with the Health and Safety Executive to control the risk of major accidents at industrial sites.
SO_2	Sulphur dioxide (a toxic and odorous gas).
SPA	Special Protected Areas are strictly protected sites classified in accordance with Article 4 of the EC Birds Directive.
SPP	Scottish Planning Policy. SPP was published on June 23, 2014. It sets out national planning policies which reflect Scottish Ministers' priorities for operation of the planning system and for the development and use of land.
SPZ1	Groundwater Source Protection Zone 1. SPZs are areas defined by the Environment Agency as areas that highlight the risk of groundwater contamination from any activities that might cause pollution in the area. SPZ1 is the inner protection zone; it is defined as the 50 day travel time from any point below the water table to the source. This zone has a minimum radius of 50 metres.
SSSI	Site of Special Scientific Interest. A SSSI is an area notified by nature conservation agencies as an area of land which is 'of special interest by reason of any of its flora, fauna, or geological or physiographical features'.
SuDS	Sustainable Drainage Systems. SuDS are a sequence of water management practices and facilities designed to drain surface water in a manner that will provide a more sustainable approach than what has been the conventional practice of routing run-off through a pipe to a watercourse.

Term	Definition
Synergistic effects	Effects that interact to produce a total effect that is greater than the sum of the individual effects.
TDS	Total dissolved solids. TDS refer to any minerals, salts, metals, cations or anions dissolved in water.
UKCP09	UK Climate Projections 09. UKCP09 provide projections on climate change based on methodology designed by the Met Office. The projections are designed to help plan how to adapt to a changing climate.
WHO	World Health Organisation. WHO is a specialised agency of the United Nations that is concerned with international public health.
WRZ	Water Resource Zone. WRZ describes an area within which the management of supply and demand of water is largely self-contained (apart from agreed bulk transfers of water).
WFD	Water Framework Directive. Directive 2000/60/EC establishing a framework for Community action in the field of water policy.

Appendix A
Assessment Guide Questions and Associated Guidance on Significance

1. BIODIVERSITY AND NATURE CONSERVATION

Approach to Assessing the Effects of the draft NPS on Biodiversity and Nature Conservation

Objective/Guide Question	Reasoning
Objective: To protect and enhance biodiversity (habitats, species and ecosystems) working within environmental capacities and limits.	The SEA Directive (2001/42/EC) requires that the likely significant effects on biodiversity should be taken into account in the Environmental Report, which for the purposes of the AoS is incorporated within the AoS Report.
Will the Geological Disposal Infrastructure NPS protect and/or enhance internationally designated nature conservation sites e.g. SACs, SPAs and Ramsar Sites?	The Habitats Directive (92/43/EEC) and the Birds Directive (2009/147/EC) include measures to maintain or restore important natural habitats and species including through the designation of Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).
Will the Geological Disposal Infrastructure NPS protect and/or enhance nationally designated nature conservation sites e.g. SSSIs?	The Wildlife and Countryside Act 1981 includes measures relating to protected sites. Devolved administrations are preparing detailed action plans on protecting habitats and species e.g. 'Biodiversity 2020 – A Strategy for England's Wildlife and Ecosystem Services', Defra 2011; '2020 Challenge for Scotland's Biodiversity - A Strategy for the conservation and enhancement of biodiversity in Scotland', Scottish Government 2013; and 'Wales Natural Resources Policy Statement', Welsh Government 2015.
Will the Geological Disposal Infrastructure NPS affect animals or plants including protected species?	The Wildlife and Countryside Act 1981 includes legislation relating to protected sites. Devolved administrations are preparing detailed action plans on protecting habitats and species.
Will the Geological Disposal Infrastructure NPS protect and/or enhance priority species and habitats?	The National Planning Policy Framework (NPPF) promotes the protection and enhancement of Species and Habitats of Principal Importance included in the England Biodiversity List published by the Secretary of State under Section 41 of the Natural Environment and Rural Communities Act 2006 (known as priority species and habitats).
Will the Geological Disposal Infrastructure NPS affect the structure and function of natural systems (ecosystems)?	Biodiversity is a highly sensitive receptor. It is likely that many of the other topics considered in this report will have an effect on biodiversity. Ecosystems will be sensitive to these interconnected effects.
Will the Geological Disposal Infrastructure NPS affect public access to areas of wildlife interest?	The Countryside and Rights of Way Act 2000 addresses public rights of way and access to open land.
Will the Geological Disposal Infrastructure NPS have an impact on fisheries?	Various inland waters could be affected by the Geological Disposal Infrastructure NPS meaning that the provisions of the Water Framework Directive (WFD) (2000/60/EC) apply as they relate to the quality of freshwaters needing protection or

improvement in order to support fish life.

Illustrative Guidance for the Assessment of Significance for Biodiversity and Nature Conservation

Effect	Description	Illustrative Guidance
++	Significant positive	• Option would have a significant and sustained positive effect on European or national designated sites and/or protected species. (e.g. – fully supports all conservation objectives on site, long-term increase in population of designated species); • Option will create new areas of wildlife interest with improved public access in areas where there is a high demand for access to these sites.
+	Positive	• Option would have a minor positive effect on European or national designated sites and/or protected species (e.g. – supports one of the conservation objectives on site, short-term increase in population of designated species); • Option would have a positive effect on local biodiversity (e.g. – through removal of all existing disturbance/pollutant emissions, or creation of new habitats leading to long-term improvement to ecosystem structure and function); • Option would enhance existing public access to areas of wildlife interest in areas where there is some demand for these sites.
0	Neutral	• Option would not have any effects on European or national designated sites and/or any species (including both designated and non-designated species); • Option would not affect public rights of way or access to areas of wildlife interest.
-	Negative	• Option would have negative effects on local biodiversity (e.g. – through an increase in disturbance/pollutant emissions, or some loss of habitat leading to temporary loss of ecosystem structure and function); • Option would decrease public access to areas of wildlife interest in areas where there is some demand for access to these sites.
--	Significant negative	• Option would have a negative effect on European or national designated sites and/or protected species (i.e. on the interest features and integrity of the site, by preventing any of the conservation objectives from being achieved or resulting in a long-term decrease in the population of a priority species). These effects could not be reasonably mitigated.
?	Uncertain	• From the level of information available the effect that the option would have on this objective is uncertain.

2. POPULATION, ECONOMICS AND SKILLS

Approach to Assessing the Effects of the draft NPS on Population, Economics and Skills

Objective/Guide Question	Reasoning
Objective: To promote a strong, diverse and stable economy with opportunities for all; improve education and skills, minimise disturbance to local communities and maximise positive social impacts.	The SEA Directive (2001/42/EC) requires that the likely significant effects on population should be taken into account in the Environmental Report, which for the purposes of the AoS is incorporated within the AoS Report.
Will the Geological Disposal Infrastructure NPS affect the social infrastructure and amenities available to local communities?	Any development of radioactive waste geological disposal facilities (in common with all major projects) has the potential to impact on the local social infrastructure and amenities which could affect the quality of life of individuals in local communities.
Will the Geological Disposal Infrastructure NPS affect local population demographics and/or levels of deprivation in surrounding areas?	The Geological Disposal Infrastructure NPS may result in change to population demographics (for example, through in migration of workers skilled to work in the industry). Changes to local population demographics and employment have the potential to impact on the local economy and demand for community facilities such as healthcare, education and recreation. Changes to these factors may alter the levels of deprivation in an area.
Will the Geological Disposal Infrastructure NPS affect opportunities for investment in education and skills development?	Investment in education and skills development are vital for economic growth.
Will the Geological Disposal Infrastructure NPS affect the number or types of jobs available in local economies?	Affecting the number or type of jobs will have influences on the local economy and productivity. The majority of jobs for GDF construction will be highly skilled (e.g. geologists, geophysicists, engineers and drilling experts) and this may have an influence on the types of jobs within the local area. The 2014 White Paper identifies that a GDF could generate around 570 direct jobs over the duration of the project with total workforce numbers rising to more than 1,000 during construction and early operation of the facility.
Will the Geological Disposal Infrastructure NPS affect how diverse and robust local economies are?	A diverse and robust economy is important to ensure economic growth.

Illustrative Guidance for the Assessment of Significance for Population, Economics and Skills

Effect	Description	Illustrative Guidance
++	Significant Positive	• Option would incorporate the provision of social infrastructure and amenities; • Option would provide educational services/facilities and offer long-term opportunities for skills development including, for example, apprenticeship

Effect	Description	Illustrative Guidance
		schemes; • Option would generate in the order of 630 or more direct full time equivalent (FTE) employment opportunities per annum[1], a large proportion of which will benefit the local community; • Option would generate significant investment in local supply chains contributing to economic growth, generating indirect employment opportunities and enhancing the robustness of the local economy (e.g. through the procurement of local contractors to undertake construction activities); • Option would significantly enhance the attractiveness of an area to existing and prospective residents and businesses (e.g. through the generation of employment opportunities).
+	Positive	• Option would stimulate some limited investment in existing services and amenities (e.g. associated with any increase in the work place population); • Option would provide some educational opportunities and skills development including, for example, apprenticeship schemes; • Option would generate some direct full time equivalent (FTE) employment opportunities per annum (below 630) which may benefit the local community; • Option would generate limited investment in local supply chains (e.g. through the procurement of local contractors to undertake construction activities); • Option would enhance the attractiveness of an area to existing and prospective residents and businesses (e.g. through the generation of employment opportunities and provision of infrastructure).
0	Neutral	• Option would not affect social infrastructure and amenities available to local communities; • Option would not affect the provision of educational services/facilities or offer opportunities for skills development; • Option would not affect any local employment opportunities/increase local unemployment rates; • Option would have no effect on wider economic benefits/undermine the growth and diversity of the local economy; • Option would not affect the attractiveness of the area to existing and prospective residents and businesses.
-	Negative	• Option would cause some disruption to existing services and amenities available to local communities which is likely to be felt in the short term; • Option would lead to a loss of some direct FTE jobs (below 630 per annum) (e.g. due to the cessation of some activities or rationalisation of activities on sites); • Option would reduce the resilience and diversity of the local economy (e.g. through loss of local supply chain opportunities); • Option would reduce local investment in an area and affect growth of local economy; • Option would undermine the attractiveness of an area to existing and prospective residents and businesses (e.g. due to impacts arising from

Effect	Description	Illustrative Guidance
		construction activities or concerns regarding operational impacts); • Option would undermine the quality of life of the local population (e.g. due to noise and vibration associated with HGV movements during construction or operation) such that some complaints could be expected.
--	Significant Negative	• Option would result in the loss of existing services and amenities available to local communities (e.g. where development is proposed on a site in community use); • Option would lead to a significant loss of direct FTE jobs (a minimum of 630 per annum) (e.g. due to the closure of local employment sites); • Option would significantly reduce the resilience and diversity of the local economy (e.g. through significant loss of local contracts and supply chain opportunities); • Option would lead to a significant reduction in investment in an area that will affect the growth of local economy; • Option would significantly undermine the attractiveness of an area to existing and prospective residents and businesses (e.g. due to impacts arising from construction activities or concerns regarding the operational impacts); • Option would seriously undermine the quality of life of the local population (e.g. due to noise and vibration associated with HGV movements during construction or operation of facilities) such that the project and local authority would be likely to experience a considerable number of complaints.
?	Uncertain	• From the level of information available the effect that the option would have on this objective is uncertain.

[1] The proposed threshold of significance represents around 1% of the existing 63,000 (direct) jobs supported by the nuclear industry in the UK, available online at: http://www.niauk.org/facts-and-information-for-nuclear-energy.

HUMAN HEALTH
Approach to Assessing the Effects of the draft NPS on Human Health

Objective/Guide Question	Reasoning
Objective: To protect and enhance health, safety and wellbeing of workers and communities and minimise any health risks associated with disposal operations.	The SEA Directive (2001/42/EC) requires that likely significant effects on human health be taken into account in the Environmental Report, which for the purposes of the AoS is incorporated within the AoS Report.
Will the Geological Disposal Infrastructure NPS protect and/or enhance the health and safety of workers, or other people working at any proposed sites?	All employers have a general duty to protect the health and safety of their employees and those affected by their work activities, as set out in the Health and Safety at Work etc. Act 1974.
Will the Geological Disposal Infrastructure NPS protect and/or enhance the health, safety and well-being of local communities and specific groups within those communities?	There is a duty to protect the health of the local communities, including more vulnerable members of the population, such as children as set out in WHO Children's Environment and Health Action Plan for Europe (CEHAPE) (2004) and the UK CEHAPE strategy (2007).
Will the Geological Disposal Infrastructure NPS protect and/or enhance the health, safety and well-being of wider communities (i.e. those communities that are not host to a GDF or deep boreholes)?	There is a duty to protect the health of the local communities, including more vulnerable members of the population, such as children as set out in CEHAPE (2004) and UK CEHAPE strategy (2007).
Will the Geological Disposal Infrastructure NPS disproportionately affect communities already identified as vulnerable/at risk?	There is a duty to protect the health of the local communities, including more vulnerable members of the population, such as children as set out in CEHAPE (2004) and UK CEHAPE strategy (2007).
Will the Geological Disposal Infrastructure NPS minimise the risk or consequences of a major accident?	Enables the consideration of the requirements of the Article 13(1)(c) of the Seveso III Directive that provides that in taking account of the need to prevent major accidents in land use policies where the siting or developments may be the source of or increase the risk or consequences of a major accident'.

Illustrative Guidance for the Assessment of Significance for Human Health

Effect	Description	Illustrative Guidance
++	Significant Positive	• Option would have a significant positive effect on the likely determinants of good health (including employment opportunities, level of deprivation, physical activity, access to open space and recreational activities, improvements to environmental quality and community safety); • Option would have a strong and sustained positive effect on health and well-being and acknowledges the health needs of specific groups in society (children, mums to be and the elderly); • Option supports the provision of healthcare facilities.

Effect	Description	Illustrative Guidance
+	Positive	• Option would have a positive effect on the likely determinants of good health (including employment opportunities, level of deprivation, physical activity, access to open space and recreational activities, improvements to environmental quality and community safety); • Option would have a positive effect on health and well-being and acknowledges the health needs of specific groups in society (children, mums to be and the elderly); • Option would support the provision of healthcare facilities (i.e. as a result of an increase in the local population linked with employment provision).
0	Neutral	• Option would have no observable effects (short-, medium- and long-term) on the health and well-being of individuals, specific groups in society (children, mums to be and the elderly) and communities.
-	Negative	• Option would have a negative effect on the likely determinants of good health (including employment opportunities, level of deprivation, physical activity, access to open space and recreational activities, improvements to environmental quality and community safety); • Option would have a negative effect on the health and well-being of individuals, specific groups in society (children, mums to be and the elderly) and communities; • Option would result in some nuisance and/or disruption to communities, such that some complaints could be expected.
--	Significant Negative	• Option would have a significant negative effect on the likely determinants of good health (including employment opportunities, level of deprivation, physical activity, access to open space and recreational activities, improvements to environmental quality and community safety); • Option would have a significant negative effect on the health and well-being of individuals, specific groups in society (children, mums to be and the elderly) and communities; • Option causes statutory nuisance or a sustained and significant nuisance and/or disruption to communities.
?	Uncertain	• From the level of information available the effect that the option would have on this objective is uncertain.

3. LAND USE, GEOLOGY AND SOILS

Approach to Assessing the Effects of the draft NPS on Land Use, Geology and Soils

Objective/Guide Question	Reasoning
Objective: To conserve and enhance soil and geology and contribute to the sustainable use of land.	The SEA Directive (2001/42/EC) requires that likely significant effects on soil and resources be taken into account in the Environmental Report, which for the purposes of the AoS is included within the AoS Report.
Will the Geological Disposal Infrastructure NPS have an effect on soil quality/function, variety, extent and/or compaction levels?	Loss of soil quality, variety, extent or an increase in soil compaction will lead to degradation of soil. The European Thematic Strategy on Soil Protection seeks the protection and sustainable use of soil, preventing soil degradation and ensuring restoration of degraded soils.
Will the Geological Disposal Infrastructure NPS increase the risk of significant land contamination?	Environment Act 1995 seeks to protect and preserve environment against pollution to land. The Soil Strategy for England (2009) and Scottish Soil Framework (2009) include objectives on reducing/preventing soil pollution and contamination.
Will the Geological Disposal Infrastructure NPS have an effect on any known and existing contamination?	Significant areas of the UK carry a burden of contamination from industrial activity. Disturbance of contaminated sites carry the risk of pollution pathways being created or re-opened for existing ground contamination.
Will the Geological Disposal Infrastructure NPS protect and/or enhance Geological Conservation Sites, important geological features and geophysical processes and functions?	National planning policy in England, Scotland and Wales seeks to protect and enhance geological conservation interests.
Will the Geological Disposal Infrastructure NPS affect land stability?	A key challenge is to ensure the correct identification and selection of geological sites, based on a risk assessment of specific geological features.
Will the Geological Disposal Infrastructure NPS change patterns of land use including effects on best and most versatile agricultural land?	National and local planning policies set out that planning should use of previously developed land where possible, and avoid using best and most versatile land.
Will the Geological Disposal Infrastructure NPS affect induced seismicity?	Research from Durham and Newcastle University has identified a range of anthropogenic causes of seismic activity including mining and petroleum exploration and production (see Wilson, M., Davies, R., Foulger, G., Julian, B., Styles, P., Gluyas, J. and Almond, S., Anthropogenic earthquakes in the UK: A national baseline prior to shale exploitation, Marine and Petroleum Geology, 2015). Given the likely range of excavation and mining techniques, and the uncertainty over host geology at this stage, there remains the possibility that such activities could lead to induced seismicity. Furthermore, due to the media profile of other boring and drilling activities, notably for unconventional oil and gas, there are public concerns over the issue of induced seismicity, even if the perception of risk is disproportionate to the actual risk. It should also be noted that in response to AoS scoping

Objective/Guide Question	Reasoning
	consultation, the Environment Agency requested that consideration was given to seismicity (comment EA10, in Appendix D of the AoS Report). In consequence, due to the available evidence, public concern and the request from the Environment Agency, the AoS has included the consideration of induced seismicity.

Illustrative Guidance for the Assessment of Significance for Land Use, Geology and Soils

Effect	Description	Illustrative Guidance
++	Significant positive	• Option would restore and significantly improve soil quality and land stability to conditions beyond current levels and remove all soil contamination so that soil functions and processes would be significantly improved in the long term; • Option would minimise the use of, and protect from irreversible damage, high quality agricultural land; • Option would have a significant and sustained positive impact on national designated geological sites; • Option would seek to minimise the use of any undeveloped land, and look to preferentially reclaim and redevelop significant areas of previously developed or derelict land.
+	Positive	• Option would generate minor improvements in soil quality and land stability and would remove some soil contamination so that soil functions and processes would be improved in the long term; • Option would reduce any potential damage to high quality agricultural land; • Option would reduce any potential hazard associated with existing soil contamination; • Option would have a minor and temporary positive impact on a national designated geological site; • Option would seek to preferentially make use of previously developed land.
0	Neutral	• Option would not significantly affect potential hazards associated with any existing contamination; • Option would not cause damage or loss to soil such that soil function and processes would not be affected; • Option would not affect land stability; • Option would not involve significant loss of any undeveloped or developed land.
-	Negative	• Option would lead to an increase in pollutant discharges to soil, however these would be less than permitted limits, such that there would be minor short-term increases in land contamination; • Option would cause minor increases in potential hazards associated

Effect	Description	Illustrative Guidance
		with existing soil contamination; • Option would cause minor increases in potential hazards associated with land stability; • Option would cause a temporary loss of soil so that soil function and processes would be negatively affected in the short/medium term; • Option would cause minor short-term negative effects on geological conservation sites/important geological features or soils of high importance; • Option would lead to the majority of development using undeveloped land or land that has reverted to a 'wild' state.
--	Significant negative	• Option would lead to a statutory limit being reached or exceeded in relation to land contamination, such that there would be a major and sustained increase in land contamination; • Option would cause major and sustained increases in potential hazards associated with existing soil contamination; • Option would cause major increases in potential hazards associated with land stability; • Option would cause considerable loss of soil quality, such that soil function and processes would be irreversibly and significantly affected; • Option would cause a substantial and permanent loss of, or damage to, soil of high importance (such as best and most versatile agricultural land) and/or designated geological conservation sites/important geological features; • Option would not develop derelict or previously developed land, but would lead to development of significant areas of undeveloped land/ land that has reverted to a 'wild' state.
?	Uncertain	• From the level of information available the effect that the option would have on this objective is uncertain.

4. WATER QUALITY

Approach to Assessing the Effects of the draft NPS on Water Quality

Objective/Guide Question	Reasoning
Objective: To maximise water efficiency, protect and enhance water quality and help achieve the objectives of the Water Framework Directive.	The SEA Directive (2001/42/EC) requires that likely significant effects on water be taken into account in the Environmental Report, which for the purposes of the AoS is incorporated within the AoS Report.
Will the Geological Disposal Infrastructure NPS affect demand for water resources?	The Water Framework Directive (2000/60/EC) encourages the sustainable use of water resources. Government strategies including 'Water for people and the environment - Water resources strategy for England and Wales' (2009) and 'Water for Life' (2011) promote the sustainable use of water. Some parts of the UK have abstraction above a sustainable level which could result in water shortages in some areas in the future.
Will the Geological Disposal Infrastructure NPS affect the amount of waste water and surface runoff produced?	Surface runoff and waste water may affect water quality if it reaches water receptors. The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 requires all inland, coastal and groundwater to reach a 'good' chemical and ecological status by 2015. Under the Water Environment (Controlled Activities) (Scotland) Regulations 2011 authorisation is required for discharges to water.
Will the Geological Disposal Infrastructure NPS protect and enhance the quality of surface, groundwater, estuarine and coastal water quality?	The Water Framework Directive (2000/60/EC) requires all inland, coastal and groundwater to reach a 'good' chemical and ecological status by 2015. Government strategies such as the including 'Water for people and the environment - Water resources strategy for England and Wales' (2009) and 'Water for Life' (2011) include objectives to protect the quality of water.

Illustrative Guidance for the Assessment of Significance for Water Quality

Effect	Description	Illustrative Guidance
++	Significant Positive	• Option would lead to a major reduction in water use compared to prior to development such that the risk of water shortages in an area is significantly decreased and abstraction is at a sustainable level in the long term; • Option would significantly decrease the amount of waste water, surface runoff and pollutant discharges so that the quality of water receptors (including groundwater, surface water, sea water or drinking receptors) would be significantly improved and sustained and water targets (including those relevant to chemical and ecological condition) reached and exceeded.
+	Positive	• Option would lead to a minor reduction in water use compared to prior to development such that the risk of water shortages in an area is decreased in the short term and abstraction is closer to sustainable levels than prior to development; • Option would lead to minor decreases in the amount of waste water, surface runoff and/or pollutant discharges so that the quality of water receptors

Effect	Description	Illustrative Guidance
		(including groundwater, surface water, sea water or drinking receptors) may be improved to some level temporarily and some water targets (including those relevant to chemical and ecological condition) would be reached/exceeded.
0	Neutral	• Option would not significantly affect water demand and abstraction levels would not be altered; • Option would not change the amount of waste water, surface runoff and/or pollutant discharges such that the quality of water receptors would not be affected.
-	Negative	• Option would lead to a minor increase in water use compared to prior to development such that the risk of water shortages in an area is increased to some level in the short term, particularly in periods of low flow, and abstraction is considered beyond sustainable levels; • Option would lead to minor increases in the amount of waste water, surface runoff and/or pollutant discharges so that the quality of water receptors (including groundwater, surface water, sea water or drinking receptors) may be decreased to some level temporarily and it may prevent some water targets (including those relevant to chemical and ecological condition) from being achieved.
--	Significant Negative	• Option would lead to major increases in water use compared to prior to development such that the risk of water shortages in an area is significantly increased and abstraction is significantly beyond sustainable levels; • Option would lead to an exceedance of an abstraction license limit; • Option would lead to major increases in the amount of waste water, surface runoff and/or pollutant discharges so that the quality of water receptors (including groundwater, surface water, sea water or drinking receptors) would be considerably increased and some or all water targets (including those relevant to chemical and ecological condition) would not be achieved.
?	Uncertain	• From the level of information available the effect that the option would have on this objective is uncertain.

5. FLOOD RISK AND COASTAL CHANGE

Approach to Assessing the Effects of the NPS on Flood Risk and Coastal Change

Objective/Guide Question	Reasoning
Objective: To minimise the risks from coastal change and flooding to people, property and communities, taking into account the effects of climate change.	The SEA Directive (2001/42/EC) requires that the likely significant effects on the environment, which includes population, human health, climatic factors, material assets and their integration, should be taken into account in the Environmental Report, which for the purposes of the AoS is incorporated within the AoS Report.
Will the Geological Disposal Infrastructure NPS help to avoid development in areas of flood risk and, where possible, reduce flood risk?	Minimising flood risk is a key part of sustainable development and is reflected in relevant legislation (such as Flood Risk Regulations 2009 and the Flood and Water Management Act 2010). Environmental and planning policy seeks to ensure that new development does not exacerbate risks (e.g. paragraph 100 of the National Planning Policy Framework 2012).
Will the Geological Disposal Infrastructure NPS help to avoid development in areas affected by coastal erosion and not affect coastal processes and/or erosion rates?	Changes to coastal processes or erosion rate caused by development have a potential to negatively impact on the marine environment. The Marine Strategy Framework Directive (2008/56/EC) require member states to achieve or maintain good environmental status in the marine environment by 2020.

Illustrative Guidance for the Assessment of Significance for Flood Risk and Coastal Change

Effect	Description	Illustrative Guidance
++	Significant Positive	• Option would result in a significant decrease in people or property at risk of or affected by flooding, coastal inundation or sea level rise.
+	Positive	• Option would result in a decrease in people or property at risk of or affected by flooding, coastal inundation or sea level rise.
0	Neutral	• Option would not lead to an overall change in people or property at risk of or affected by flooding, coastal inundation or sea level rise. • Option would result in development being sited in Flood Zone 1 (or equivalent) areas.
-	Negative	• Option would result in an increase in people or property at risk of or affected by flooding, coastal inundation or sea level rise. • Option would result in development being sited in Flood Zone 2 (or equivalent) areas.
--	Significant Negative	• Option would result in a significant number of people or property affected by flooding, coastal inundation or sea level rise. • Option would result in development being sited in Flood Zone 3 (or equivalent) areas.

Effect	Description	Illustrative Guidance
?	Uncertain	• From the level of information available the effect that the option would have on this objective is uncertain.

6. AIR

Approach to Assessing the Effects of the draft NPS on Air Quality

Objective/Guide Question	Reasoning
Objective: To minimise emissions of pollutant gases and particulates and enhance air quality, helping to achieve the objectives of the Air Quality and Ambient Air Quality and Cleaner Air for Europe Directives.	The SEA Directive (2001/42/EC) requires that likely significant effects on air quality be taken into account in the Environmental Report, which for the purposes of the AoS is incorporated within the AoS Report.
Will the Geological Disposal Infrastructure NPS affect air quality?	The Ambient Air Quality and Cleaner Air for Europe Directive (2008/50/EC) aims to avoid the harmful effects on human health and the environment from air pollution and includes objectives and targets for ambient air quality. This is transposed into UK law by Air Quality Standards Regulations 2010.
Will the Geological Disposal Infrastructure NPS create a nuisance for people or wildlife (for example from dust or odours)?	Emissions to air may create dust or odours that have the potential to affect air quality or to be classed as a statutory nuisance (as under Environmental Protection Act 1990).

Illustrative Guidance for the Assessment of Significance for Air Quality

Effect	Description	Illustrative Guidance
++	Significant Positive	• Option would significantly improve local air quality through a sustained reduction in concentrations of pollutants identified in national air quality objectives.
+	Positive	• Option would lead to a minor improvement in local air quality from a reduction in concentrations of pollutants identified in national air quality objectives.
0	Neutral	• Option would not affect local air quality.
-	Negative	• Option would result in a minor decrease in local air quality; • Option would have a negative effect on local communities and biodiversity due to an increase in air and odour pollution and particulate deposition.
--	Significant Negative	• Option would cause a significant decrease in local air quality (e.g. leading to an exceedance of Air Quality Objectives for designated pollutants and the designation of a new Air Quality Management Area); • Option would have a strong and sustained negative effect on local communities and biodiversity due to significant increase in air and odour pollution and particulate deposition.

Effect	Description	Illustrative Guidance
?	Uncertain	• From the level of information available the effect that the option would have on this objective is uncertain.

7. NOISE

Approach to Assessing the Effects of the draft NPS on Noise

Objective/Guide Question	Reasoning
Objective: To minimise noise pollution and the effects of vibration.	EU and UK policy on noise management and reduction guides the preparation of strategies at the UK and local levels to avoid and limit what is a pollutant. As such, the issues are important to the AoS Report in respect of human health, in particular.
Will the Geological Disposal Infrastructure NPS help to minimise noise and vibration effects from construction and operational activities on residential amenity and effects on sensitive locations and receptors?	The impacts of noise pollution and from vibration on specific localities will need careful consideration in all phases of any project associated with the development of a GDF. This could include local strategies based on general principles and practical measures for noise and vibration avoidance and limitation.

Illustrative Guidance for the Assessment of Significance for Noise

Effect	Description	Illustrative Guidance
++	Significant Positive	• Option would significantly improve the ambient noise environment in the vicinity of potential or actual sites.
+	Positive	• Option would lead to an improvement in the ambient noise environment in the vicinity of potential or actual sites.
0	Neutral	• Option would not affect the noise environment of potential or actual sites.
-	Negative	• Option would result in a minor negative effect on the ambient noise environment in the vicinity of potential or actual sites; • Option would cause minor disturbance associated with vibration on potential or actual sites.
--	Significant Negative	• Option would result in a major negative effect on the ambient noise environment in the vicinity of potential or actual sites over the short or longer term; • Option would cause major disturbance associated with vibration on potential or actual sites over the short or longer term.
?	Uncertain	• From the level of information available the effect that the option would have on this objective is uncertain.

8. CLIMATIC FACTORS

Approach to Assessing the Effects of the draft NPS on Climatic Factors

Objective/Guide Question	Reasoning
Objective: To minimise greenhouse gas emissions as a contribution to climate change and ensure resilience to any consequences of climate change.	The SEA Directive (2001/42/EC) requires that the likely significant effects on the environment, which includes population, human health, climatic factors, material assets and their integration, should be taken into account in the Environmental Report, which for the purposes of the AoS is incorporated within the AoS Report.
Will the Geological Disposal Infrastructure NPS help to ensure a low carbon design solution to the disposal of higher activity radioactive waste, at both construction and operation phases?	Government legislation (Climate Change Act 2008; Flood and Water Management Act 2010) and strategies seek to address the causes and consequences of climate change, minimising harmful emissions and investing in infrastructure that will help limit the consequences of climate change on life, property and other environmental indicators considered as part of this assessment. Government legislation (under international agreements) commits to the progressive reduction in CO_2 and other greenhouse gas emissions.
Will the Geological Disposal Infrastructure NPS promote climate change adaptation (including rising temperatures and more extreme weather events)?	UKCP09 scenarios show that increasing temperatures and changes to precipitation, increased storminess and extreme weather is expected, which has the potential to impact on the proposals.

Illustrative Guidance for the Assessment of Significance for Climate Change and Flood Risk

Effect	Description	Illustrative Guidance
++	Significant Positive	• Option would help to significantly reduce carbon and other greenhouse gas emissions; • Option would increase resilience/decrease vulnerability to climate change in the wider environment.
+	Positive	• Option would help to reduce carbon and other greenhouse gas emissions; • Option would increase resilience/decrease vulnerability to climate change in the wider environment.
0	Neutral	• Option would not lead to an overall change in carbon and other greenhouse gas emissions in a way that would not contribute to climate change or resilience to climate change within the wider environment.
-	Negative	• Option would increase carbon and other greenhouse gas emissions; • Option would decrease resilience/increase vulnerability to climate change in the wider environment.
	Significant Negative	• Option would significantly increase carbon and other greenhouse gas emissions;

Effect	Description	Illustrative Guidance
--		• Option would decrease resilience/increase vulnerability to climate change in the wider environment.
?	Uncertain	• From the level of information available the effect that the option would have on this objective is uncertain.

9. WASTE AND RESOURCE USE

Approach to Assessing the Effects of the draft NPS on Waste and Resource Use

Objective/guide question	Reasoning
To minimise waste arisings, promote reuse, recovery and recycling, minimise the impact of wastes on the environment and communities and contribute to the sustainable use of natural and material assets.	The SEA Directive (2001/42/EC) requires likely effects on material assets (including resources) be taken into account in the Environmental Report, which for the purposes of the AoS is incorporated within the AoS Report.
Will the Geological Disposal Infrastructure NPS affect the amount of hazardous and non-hazardous wastes produced?	The Waste Framework Directive (2008/98/EC) promotes a hierarchical approach to waste management with waste prevention at the top of the hierarchy. This is supported through national strategies such as the 'Waste Management Plan for England' (Defra, 2013). In addition, the Basel Convention promotes minimisation of generation of quantities of hazardous waste in order to prevent against problems and challenges posed by hazardous waste.
Will the Geological Disposal Infrastructure NPS affect the capacity of existing waste management systems, both nationally and locally?	The UK currently has no specific facility or capacity for the disposal of Higher Activity Waste. The 2014 White Paper sets out the types of radioactive waste to be managed, and a proposed way forward through the creation of a GDF. As such, the proposals will help to create the required capacity to accommodate this particular waste stream.
Will the Geological Disposal Infrastructure NPS maximise re-use and recycling of recovered components and materials?	Recovering and recycling waste will assist in decreasing the amount of waste to landfill. The Landfill Directive (1999/31/EC) aims to reduce amount of biodegradable waste going to landfill to 35% of the 1995 figures by 2020. The Waste Management Plan for England also includes targets for recycling rates.
Will the Geological Disposal Infrastructure NPS help achieve government and national targets for minimising, recovering and recycling waste?	Minimising, recovering and recycling waste will assist in decreasing the amount of waste to landfill. The Landfill Directive (1999/31/EC) aims to reduce amount of biodegradable waste going to landfill to 35% of the 1995 figures by 2020. This is supported through the Waste Management Plan for England.
Will the Geological Disposal Infrastructure NPS increase the burden on limited natural resources?	Conservation of resources and living within environmental limits are underlying objectives of several the international policies such as European Spatial Development Perspective, and national policy, such as Framework for Sustainable Development. The National Planning Policy Framework and Planning Practice Guidance seeks to facilitate the sustainable use of minerals.
Will the Geological Disposal Infrastructure NPS make best use of existing infrastructure and resources?	Use of existing infrastructure and resources will decrease the total resources required and will increase efficiency.

Illustrative Guidance for the Assessment of Significance for Waste and Resource Use

Effect	Description	Illustrative Guidance
++	Significant Positive	• Option would increase the capacity of waste management infrastructure; • Option would create no additional hazardous or non-recyclable waste, whilst maximising the proportion of materials that are re-useable or recyclable; • Option would ensure the safe handling of hazardous wastes; • Option would make best use of existing infrastructure and resources (e.g. buildings and other facilities on sites) and help conserve natural resources.
+	Positive	• Option would not create an increase in the volume of hazardous and non-recyclable wastes that require disposal; • Option would increase the volume of materials reused and recycled; • Option would make best use of existing infrastructure and resources (e.g. buildings and other facilities on sites).
0	Neutral	• Option would not create an increase in the volume of hazardous and non-recyclable wastes that require disposal; • Option would have no effect on the capacity of waste management infrastructure; • Option would not have any impact on existing natural resources.
-	Negative	• Option would increase volumes of hazardous and non-recyclable waste that would require disposal; • Option would have a limited adverse impact on the capacity of existing waste management systems; • Option would require the limited use of natural resources during construction and operational stages.
--	Significant Negative	• Option would generate a high volume of hazardous and non-recyclable waste that would require disposal; • Option would impede the achievement of government and national targets for minimising, recovering and recycling waste; • Option would have a significant adverse impact on the capacity of existing waste management systems (e.g. leading to the permitting of additional landfill capacity to accommodate waste); • Option would increase risks associated with the handling of hazardous wastes; • Option would require a significant volume of natural resources and result in the direct loss of resources.
?	Uncertain	• From the level of information available the effect that the option would have on this objective is uncertain.

10. TRAFFIC AND TRANSPORT

Approach to Assessing the Effects of the draft NPS on Traffic and Transport

Objective/Guide Question	Reasoning
Objective: To minimise the volume of traffic and promote more sustainable transport choices.	Whilst traffic and transport is not specifically referred to in the SEA Directive (2001/42/EC), the issue is a significant one in the case of the GDF given the scale, duration and extent of construction, operation, decommissioning and closure.
Will the Geological Disposal Infrastructure NPS help to minimise traffic volumes?	Traffic, comprising heavy goods vehicles, passenger vehicles and trains can have a significant influence over noise, air quality, climate change, wildlife habitats and quality of life of communities in the vicinity of operations. The control of traffic volumes will help to minimise these effects.
Will the Geological Disposal Infrastructure NPS help to minimise the direct effects of transport such as noise and vibration, severance of communities and wildlife habitats and safety concerns?	Minimising the direct effectis of traffic and transport on people and the environment is a key aim of national planning policy, and by extension issues such as human health in the SEA Directive. As such, these effects should be taken into consideration in the planning and management of traffic associated with implementing the NPS.
Will the Geological Disposal Infrastructure NPS encourage alternative and sustainable means of transporting freight, waste and minerals, where possible?	The development and use of sustainable transport is a major theme in national planning policy and as such, transport substitution (for example road to rail) wherever possible is encouraged, as well as trip minimisation. In turn this will help to meet air quality targets set locally, nationally and internationally.

Illustrative Guidance for the Assessment of Significance for Traffic and Transport

Effect	Description	Illustrative Guidance
++	Significant Positive	• Option would make a significant positive and long-term contribution to minimising the direct and indirect effects of traffic and transport associated with the GDF.
+	Positive	• Option would make a positive contribution to minimising the direct and indirect effects of traffic and transport associated with the GDF.
0	Neutral	• Option would not have any significant effects on traffic and transport.
-	Negative	• Option would have minor, short-term effects associated with the direct and indirect impacts of traffic and transport associated with the GDF.
--	Significant Negative	• Option would cause significant long-term effects associated with the direct and indirect impacts of traffic and transport associated the GDF.

Effect	Description	Illustrative Guidance
?	Uncertain	• From the level of information available the effect that the option would have on this objective is uncertain.

11. CULTURAL HERITAGE

Approach to Assessing the Effects of the draft NPS on Cultural Heritage

Objective/Guide Question	Reasoning
Objective: To protect and where appropriate enhance the historic environment including cultural heritage resources, historic buildings and archaeological features and their settings.	The SEA Directive (2001/42/EC) requires that the likely significant effects on cultural heritage including architectural and archaeological heritage should be taken into account in the Environmental Report, which for the purposes of the AoS is incorporated within the AoS Report.
Will the Geological Disposal Infrastructure NPS affect designated or locally-important archaeological features or their settings?	A number of legislative provisions require the protection of sites designated for archaeological or cultural heritage importance including the Ancient Monuments and Archaeological Areas Act 1979 and Planning (Listed Buildings and Conservation Areas) Act 1990. National planning policy in England requires the protection of the most important components of historic landscapes and encourages development that is consistent with maintaining its overall historic character.
Will the Geological Disposal Infrastructure NPS affect the fabric and setting of historic buildings, places or spaces that contribute to local distinctiveness, character and appearances?	

Illustrative Guidance for the Assessment of Significance for Cultural Heritage

Effect	Description	Illustrative Guidance
++	Significant Positive	• Option would make a significant positive and long-term contribution to the setting and conservation of designated and locally important cultural heritage features (e.g. through enhancement of setting, permanent removal of a structure creating a negative visual impact, large scale enhancement of designated features).
+	Positive	• Option would bring minor short-term improvements to the setting and conservation of designated and locally important cultural heritage features (e.g. temporary removal of structure creating a negative visual impact).
0	Neutral	• Option would not have any significant effects on any cultural heritage sites or assets or their setting.
-	Negative	• Option would bring minor short-term degradation to the setting and conservation of designated and locally important cultural heritage features (e.g. temporary use of equipment/structures creating a negative visual impact).
--	Significant Negative	• Option would cause long-term degradation to the setting and conservation of designated and locally important cultural heritage features (e.g. through direct and permanent loss or damage to designated sites, introduction of a structure that will have a considerable and permanent negative visual impact).

Effect	Description	Illustrative Guidance
?	Uncertain	• From the level of information available the effect that the option would have on this objective is uncertain.

12. LANDSCAPE AND TOWNSCAPE

Approach to Assessing the Effects of the draft NPS on Landscape and Townscape

Objective/Guide Question	Reasoning
Objective: To protect and enhance landscape and townscape quality and visual amenity.	The SEA Directive (2001/42/EC) requires that the likely significant effects on landscape should be taken into account in the Environmental Report, which for the purposes of the AoS is incorporated within the AoS Report.
Will the Geological Disposal Infrastructure NPS have significant visual impacts (including those at night)?	Visual impacts can influence how people perceive a landscape or townscape and can decrease the character and intrinsic value.
Will the Geological Disposal Infrastructure NPS affect protected/designated landscapes or their setting?	Areas designated for their landscape value are important at a national level and should be protected from adverse effects and enhanced where possible.
Will the Geological Disposal Infrastructure NPS affect the intrinsic character or setting of local landscapes or townscapes?	Considering the protection and enhancement of landscape and townscape character is a requirement of the NPPF, SPP and PPW.
Will the Geological Disposal Infrastructure NPS help to minimise light pollution from construction and operational activities on residential amenity and on sensitive locations and receptors?	The consideration of light pollution is a requirement of the NPPF and PPW.
Will the Geological Disposal Infrastructure NPS affect public access to open spaces or the countryside?	National Parks and Access to the Countryside Act 1949 and Countryside and Rights of Way Act 2000, for example, make provision for the recording, creation, maintenance and improvement of public paths and for securing access to open country and confers further powers for preserving and enhancing natural beauty.

Illustrative Guidance for the Assessment of Significance for Landscape and Townscape

Effect	Description	Illustrative Guidance
++	Significant Positive	• Option would make a significant positive contribution to statutorily-designated landscapes and/or their setting; • Option would have a significant positive effect on local landscapes and townscapes and/or their setting (e.g. through the replacement of poorly designed/derelict buildings with high quality development); • Option would enhance public access to the countryside and increase open space provision.
+	Positive	• Option would serve to enhance statutorily-designated landscapes and/or their setting; • Option would have a positive effect on local landscapes and townscapes and/or their setting; • Option would enhance public access to open spaces and the countryside.

Effect	Description	Illustrative Guidance
0	Neutral	• Option would not have any effect on statutorily-designated landscapes or their setting; • Option would not have any effects on local landscapes and townscapes or their setting • Option would not affect visual amenity; • Option would not enhance or restrict public access to open spaces and the countryside.
-	Negative	• Option would have short-term negative effects on statutorily-designated landscapes and/or their setting; • Option would have a negative effect on the intrinsic character of local landscapes and townscapes and/or their setting; • Option would affect the visual amenity of local communities; • Option would temporally restrict public access to open spaces and the countryside.
--	Significant Negative	• Option would have long-term negative effects on statutorily-designated landscapes (such as AONBs) and/or their setting; • Option would severely affect the intrinsic character of local landscapes and townscapes and/or their setting; • Option would severely affect the visual amenity of local communities; • Option would result in the loss of open spaces and restrict public access to the countryside.
?	Uncertain	• From the level of information available the effect that the option would have on this objective is uncertain.

Appendix B
Detailed Appraisal including Baseline and Contextual Information

See separate document.

Appendix C
Mitigation and Enhancement Measures

Summary of Mitigation and Enhancement Measures

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Air Quality (Section 5.2)	• Early pre-application engagement with, the relevant local planning authority and the Environment Agency on air quality issues could be encouraged.
	• Applicants could be encouraged to consider local air quality action plans and strategies, where relevant and appropriate.
	• The following additional requirements could be outlined for inclusion in an ES:
	  • The legislative, regulatory and policy context for the assessment;
	  • the evolution of the air quality baseline, without the proposed development proceeding;
	  • a description of the basis for determining significance of effects arising from the impacts;
	  • details of the assessment methods;
	  • air quality model verification;
	  • the identification of sensitive locations and receptors; and
	  • a summary of the assessment results including the significance of any residual (post mitigation) effects on air quality.
		• Reference to the requirements for HRA could be usefully included.	The mitigation could be revised to be more specific and clearly reflect the key project stages of site investigation, construction and operation and closure, as follows:
			Site Investigation
			• Minimise emissions from on-site plant.
			• Minimise emissions from vehicles.
			• Prevent dust generation.
			• Suppress dust during dry weather.
			• Develop, implement and review an Environmental Management Plan (EMP).
			Construction
			• See measures identified for site investigation.
			• Inclusion of appropriately designed ventilation systems, in accordance with best practice, to minimise emissions of pollutants.
			Operation and Closure
			• See measures identified for construction and site investigation.
			• Environmental management and monitoring in relation to air quality and dust as a continuous, ongoing activity.
			• Dust suppression measures, as required, during demolition / clearance of surface facilities.

Noise (Section 5.3)	• Reference to the World Health Organisation (WHO) standards on noise 'Guidelines for community noise' and/or	• No recommendations identified.	The mitigation could be revised to be more specific and clearly reflect the key project stages of site investigation, construction and

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	the Environmental Noise Directive (2002/49/EC) could be made.
	• In addition to the information already contained in Section 5.3, the following requirements could be outlined for inclusion in an ES:
	  • the identification of noise sensitive premises and noise sensitive areas including key receptors that could be particularly affected and/or disrupted by noise;
	  • a description of the basis for determining significance of effects arising from the impacts;
	  • if BS4142 assessment is carried out, a full noise survey report; and
	  • an indication of whether, post mitigation, there are any residual effects that would still be considered significant.
			operation and closure, as follows:
			Site Investigation
			• Full consideration of noise and vibration issues in the siting process.
			• Implementation of best practice measures to limit noise levels, expressed through an EMP that is subject to periodic review.
			• Limit noisiest activities to certain times of day and weekdays only, where possible.
			Construction
			• See measures identified for site investigation.
			• Detailed design of surface facilities to minimise noise of both construction and future operational activities through the:
			  • choice of plant;
			  • layout and design of facilities;
			  • enclosing of noisy plant or activities;
			  • incorporation of noise barriers/baffles at sources of noise; and
			  • incorporation, where appropriate, of noise barriers (bunds or vertical barriers) into the detailed design of the site, potentially as part of landscape works.
			Operation and Closure
			• See measures identified for construction and site investigation.
			• Any required screening etc. should

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			already be in place by the start of the operational period. Maintenance will be an ongoing activity. • Ongoing noise monitoring to ensure that defined targets are not exceeded and that remedial measures are implemented if they are. • Monitoring of other development proposals to comment on planning applications etc. if they are sufficiently close that complaints about noise may arise.
Biodiversity and Nature Conservation (including Flora and Fauna) (Section 5.4)	• Consideration could be given to providing further guidance on the possible contents of an ES. Requirements could include: • **Scoping** o Identify the likely zone of influence of the proposed development. o Identify and evaluate ecological resources and features (habitats, species and ecosystems, including ecosystem function and processes) likely to be affected (could include ecological survey/research). o Describe any future anticipated changes to ecological conditions in the absence of the proposed project, to inform the assessment of impacts. o Provide the basis for determining significance of effects arising from	• No recommendations identified.	The mitigation could be revised to be more specific and clearly reflect the key project stages of site investigation, construction and operation and closure, as follows: **Site Investigation** • Full consideration of effects on biodiversity, flora, fauna and ecosystem services in the siting process. • Design/implementation of all geophysical and deep borehole surveys within the context of an EMP that is periodically reviewed. • Identification of any designated sites, sensitive habitats and records of protected species ahead of any surveys and avoidance of sensitive locations and times of the year as far as possible. • Reinstatement of working sites to ensure that habitats are returned to their previous condition or better, with appropriate aftercare. If reinstatement

Draft NPS Topic/Section	Applicant's Assessment	Decision Making	Mitigation
	the impacts. • **Impact assessment** o Assess whether important ecological features will be subject to impacts and characterise these impacts and their effects (including scale, duration and significance). o Assess the residual ecological impacts of the project remaining after mitigation and the significance of their effects, including cumulative effects. • **Avoidance, mitigation, compensation and enhancement** o Identify and incorporate measures to avoid, reduce and compensate ecological impacts, and the provision of ecological enhancements. o Detail proposals for monitoring impacts of the development and evaluation of the success of proposed mitigation, compensation and enhancement measures. • **Advice for decision makers** o Provide advice on the consequences for decision making of the significant ecological impacts, based on the value of the affected resource or feature and consideration of the		cannot be achieved, compensatory habitat creation measures should be provided. **Construction** • See measures identified for site investigation. • Preparation of a construction phase EMP including specific attention to matters such as transport access arrangements and opportunities for habitat enhancement on- and off-site, potentially as part of green infrastructure and biodiversity off-setting measures as agreed with appropriate regulators. • Detailed design and layout of a GDF to seek to retain or minimise loss of any valuable biodiversity habitats and species and retain any linkages (corridors) between areas that could become isolated, as well as proposals for restoration following completion of construction works. • If retention or other adequate mitigation cannot be achieved, then compensatory replacement habitat may be required offsite, potentially in tandem with landscape measures. **Operation and Closure** • See measures identified for construction and site investigation. • The development, implementation and periodic review of an operational phase EMP.

Draft NPS Topic/Section	Applicant's Assessment	Decision Making	Mitigation
	legal and policy framework throughout the impact assessment process.		• Ongoing management and maintenance of any biodiversity mitigation features on site (e.g. any created habitat etc.) throughout the lifetime of geological disposal infrastructure. • Monitoring to determine the effectiveness of mitigation measures (commencing immediately after their establishment in the construction phase), with additional remedial measures if they are not achieving defined targets. • Commencement of pre-closure ecological surveys. • Engagement with local stakeholders regarding desirable outcomes for biodiversity from site restoration, in the context of prevailing environmental conditions. • Restoration of the site to its pre-development condition so far as possible, or better. • Implementation of appropriate aftercare/management arrangements to ensure the long-term success of the biodiversity mitigation and reinstatement works.
Climatic Factors including Climate Change and Adaptation (Section 5.5)	• The text at paragraph 5.5.4 could usefully refer to the need for applicants to include associated developments when considering the impacts of climate change in the appraisal of scheme options. This paragraph could also stipulate how applicants must consider	• No recommendations identified.	The mitigation could be revised to be more specific and clearly reflect the key project stages of site investigation, construction and operation and closure, as follows: **Site Investigation** • Full consideration of climate change

Draft NPS Topic/Section	Applicant's Assessment	Decision Making	Mitigation

	the impacts of climate change when planning the location, design, build, operation and decommissioning and final closure of geological disposal infrastructure.
	• The information to be included in assessments of carbon impacts, climate change and resilience to the effects of climate change could be made more explicit.
	• Paragraph 5.5.5 could make reference to emissions during operation and closure (including in respect of associated developments).
	• Consideration could be given to providing further guidance on the possible contents of an ES with regard to climatic factors, including a requirement for carbon impact assessment. Requirements could include:
	  • inclusion of an Energy Statement (if required);
	  • presentation of any modelling or detailed quantification of a project's greenhouse gas (GHG) emissions through its construction and operation;
	  • a description of the basis for determining significance of effects arising from the impacts;
	  • the identification of any mitigation, compensation or monitoring related to GHG emissions; and
			issues in the siting process.
			• Seek to minimise embodied energy/carbon in construction materials.
			• Design and locate site offices to maximise energy efficiency.
			• Incorporate energy efficiency/ emission reduction measures in EMPs.
			• Maximise the use of renewable energy sources, including alternative fuel sources for site based equipment.
			• Consider opportunities to minimise CO_2 emissions associated with staff travel, including provision of alternative modes of transport.
			Construction
			• See measures identified for site investigation.
			• Consider climate change issues, including resilience to change, adaptability and climate-change effects, in the construction-phase EMP.
			• Use/specify materials with high recycled content and inherently low embodied carbon content, for example use of a percentage of pulverised fly ash or ground granulated blast-furnace slag for concrete/shotcrete, and recycled steelwork.
			• Minimise distances for transporting construction materials to site, through specification of local sources where feasible.

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	• a summary of the assessment results including the significance of any residual (post mitigation) effects.		• Minimise distance for offsite spoil disposal. • Consider opportunities to minimise CO_2 emissions associated with staff travel, including provision of alternative modes of transport (alternatives to car travel, such as provision of staff park and ride facility or measures to encourage cycling) and/or site based worker accommodation. **Operation and Closure** • See measures identified for construction and site investigation. • Environmental management regarding climate change adaptability and resilience throughout operational period. • Periodic review of the effectiveness of the resilience measures. • Periodic review and updating of EMPs. • Appropriate response to change as observed. • Consider alternative transport modes for radioactive waste and minimise distance travelled to/from site.
Cultural Heritage including Architectural and Archaeological Heritage (Section 5.6)	• Consideration could be given to providing further guidance on the possible contents of an ES with regard to cultural heritage. Requirements could include: • the planning policy context; • the methodology for the assessment; • the baseline environment including	• No recommendations identified.	The mitigation could be revised to be more specific and clearly reflect the key project stages of site investigation, construction and operation and closure, as follows: **Site Investigation** • Avoidance of designated heritage assets or undesignated assets of equivalent

Draft NPS Topic/Section	Applicant's Assessment	Decision Making	Mitigation
	the significance of heritage assets; • assessment criteria and assignment of significance; and • a summary of the assessment results including the significance of any residual (post mitigation) effects.		value. • Avoidance of other heritage assets where possible and/or adverse effects minimised. • Sensitive location of site works to avoid adverse impacts on the setting of heritage assets. • Design methodology for compounds, access roads etc. to minimise ground disturbance. • Conduct archaeological watching brief and liaise with appropriate archaeological curator/ other authorities regarding other mitigation requirements. **Construction** • See measures identified for site investigation. • Consideration of potential effects on the setting of historic buildings and other heritage assets in site selection and design. • Maintenance of the integrity of historic landscapes where practicable. • Enhancement of access to heritage assets where appropriate. • Liaison with local community regarding cultural environments. **Operation and Closure** • See measures identified for construction and site investigation. • Establishment of 'legacy' maintenance

Draft NPS Topic/Section	Applicant's Assessment	Decision Making	Mitigation
			arrangements for heritage assets on site or in vicinity and for any access arrangements. • Ensure closure does not compromise the setting of any nearby heritage assets.
Socio-economics, Population and Demographics (Section 5.7)	• Consideration could be given to the inclusion of a specific requirement that the direct, indirect and induced employment associated with both the construction and operation of geological disposal infrastructure should be assessed. • The need to consider legacy/arrangements for long-term management could be highlighted.	• No recommendations identified.	The mitigation could be revised to be more specific and clearly reflect the key project stages of site investigation, construction and operation and closure, as follows: **Site Investigation** • Development of a programme for community engagement. This could incorporate a public outreach strategy that addresses safety concerns from the local and broader population. • Establishment of a Community Liaison Group to liaise with community leaders about opportunities for community development. • Development and implementation of an employee code of conduct including guidance on behaviour offsite and outside of working times. • Partnering with a local training provider and national skills body to establish a construction apprenticeship learning hub. • Introduction of a Property Value Protection Plan to compensate property owners for any losses associated with a decrease in property values, rental income or associated mortgages attributable to geological disposal

Draft NPS Topic/Section	Applicant's Assessment	Decision Making	Mitigation
			infrastructure. • Provision of measures to support local procurement opportunities such as a local business engagement strategy. • Development and implementation of an Accommodation Strategy for new workers **Construction** • See measures identified for site investigation. **Operation and Closure** • See measures identified for site investigation and construction. • Implementation of an economic transition scheme for transition between project phases and for post closure.
Flood risk and Coastal Change (Section 5.8)	• Guidance could be provided relating to the contents of a vulnerability assessment, as required for development within Coastal Change Management Areas.	• No recommendations identified.	The mitigation could be revised to be more specific and clearly reflect the key project stages of site investigation, construction and operation and closure, as follows: **Site Investigation** • Incorporation of protection/treatment of run-off to avoid siltation of watercourses where necessary. • Ensuring that watercourse crossing numbers are minimised and flood and pollution control measures incorporated where crossings are required. • Achievement of attenuation to greenfield rates of run-off and no increase in run-off volumes where possible.

Draft NPS Topic/Section	Applicant's Assessment	Decision Making	Mitigation
			Construction • See measures identified for site investigation. • The development, implementation and periodic review of an EMP. • Incorporation of SuDS, with surface storage and attenuation to greenfield rates and no increase in run-off volume where possible. • Plan works to minimise duration of dewatering requirements. • Cover excavated rock, especially lower strength sedimentary rock, rapidly with soil, to prevent risk of siltation. **Operation and Closure** • See measures identified for construction and site investigation. • The development, implementation and periodic review of an operational phase EMP. • Site restoration should ensure a similar surface run-off regime to that originally present, allowing for any other changes in the surrounding environment in the intervening decades (unless an alternative end state is agreed with the local community).
Human Health (Section 5.9)	• The need to consider the potential for impacts on the demand for health services in the host community could be highlighted. • Further clarity and guidance could be	• No recommendations identified.	The mitigation could be revised to be more specific and clearly reflect the key project stages of site investigation, construction and operation and closure, as follows: **Site Investigation**

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	provided in respect of anxiety and stress. • Cross-reference could be made to mitigation in other relevant sections (e.g. noise, air quality and water quality). • More guidance could be provided on the anticipated scope and content of a health chapter for an ES.		• Mitigation could acknowledge the relevance of wider determinants of health (both mental and physical). • The development, implementation and periodic review of an EMP. **Construction** • See measures identified for site investigation. • Reference could be made to measures including improvements to local public transport services, helping to reduce any severance from recreational and amenity features caused by changes to the local road network and helping to reduce congestion. They might also include creation of new transport infrastructure such as roads, footpaths and cycle-ways, which could provide or improve access to existing recreational and amenity facilities. **Operation and Closure** • See measures identified for site investigation and construction.

Landscape and Visual Impacts (Section 5.10)	• Specific guidance on the likely contents of an ES would be helpful. Requirements could include:
	  • consideration of the sensitivity of landscape character and views to change, and on the magnitude of change likely to occur;
	  • provision of criteria for identifying the sensitivity of different landscape and visual receptors to change;
		• No recommendations identified.	The mitigation could be revised to be more specific and clearly reflect the key project stages of site investigation, construction and operation and closure, as follows:
			Site Investigation
			• Effective engagement with communities to identify valued features.
			• Avoidance of landscape features where possible.

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	• identification of the key landscape and visual receptors and their sensitivity; • conclusions on the significance of any effects that are predicted upon landscape features and character or on visual amenity; and • the identification of mitigation measures.		• Design to minimise adverse effects on visual amenity. • Avoidance/minimisation of lighting where possible (consistent with security requirements). • Planning work to facilitate site restoration, including aftercare. • Following good practice in the protection, management and restoration of soils. • The development, implementation and periodic review of an EMP. **Construction** • See measures identified for site investigation. • Consideration of landscape/visual effects in site selection and design, with any mitigation designed to be in character with the local landscape and the requirements of site security. • Minimisation of building footprints. • Consideration of both on and off site landscape and planting works. • Consideration of landscape works in an integrated way with ecology/biodiversity mitigation. • The development, implementation and periodic review of a construction phase EMP. • Establishment of temporary screening at outset and replacement with longer-term landscape bunding and planting to screen views of site and integrate into

Draft NPS Topic/Section	Applicant's Assessment	Decision Making	Mitigation
			landscape, subject to the requirements of site security. • Establishment of planting as early as possible to maximise its effectiveness and use of locally-sourced native tree and shrub species. **Operation and Closure** • See measures identified for site investigation and construction. • Development, implementation and periodic review of an operational phase EMP. • Landscape/visual mitigation and enhancements to be implemented and a long-term maintenance plan established and implemented. • Preservation of visual integrity of outermost bunds providing visual screening, using bunds further into the interior for rock storage/handling. • Avoidance of lighting outer perimeter fence. Careful design of lighting of inner security fence and lighting of active areas to minimise light spillage. • Appropriately designed site restoration, with input from local stakeholders, taking into account the landscape context at the time of closure. • Where appropriate and possible, restoration of any landscape/habitat lost as a result of geological disposal infrastructure on a like-for-like or better

Draft NPS Topic/Section	Applicant's Assessment	Decision Making	Mitigation
			basis, with aftercare provision. • Where appropriate, retention of mature landscape features established as part of landscape and visual mitigation during construction or operation.
Land Use (Section 5.11)	• The section could be titled: Land Use, Soil and Geology to reflect the issues covered. • The need to consider potential impacts on marine uses could be highlighted. • The requirement for a Resource Management Plan could be specified, including consideration of soils and other excavated material. • Reference could be included to the NPPF and Environmental Protection Act 1990 in relation to land use, geology and soils. • The need to consider geological stability, faulting and the effects of natural and induced seismicity could be highlighted. • Developers could be required to follow Defra's code of practice on the sustainable use of soils on construction sites and to reflect existing guidance and best practice. • Consideration could be given to providing further guidance on the possible contents of an ES with regard to land use/marine activity, geology and soils. Requirements could include: • the baseline characteristics and	• The need to consider geological stability, faulting and the effects of natural and induced seismicity could be highlighted.	The mitigation could be revised to be more specific and clearly reflect the key project stages of site investigation, construction and operation and closure, as follows: **Site Investigation** • Full consideration of land-use effects in the siting process. • In the detailed design of site-based investigations, seek to minimise the number of sites and extent of land required at each site, balancing the need for information to adequately describe and understand the geological environmental with any adverse effects. • Location of drilling sites with reference to existing roads/tracks to minimise length of new temporary access tracks. • Consultation with landowners and tenant farmers in selecting locations and access routes to minimise disruption. • Seek to locate drilling sites and site offices on previously developed land where it is available in suitable locations. • Seek to avoid existing community resources where possible, including public rights of way. • Development of a site-specific soil

Draft NPS Topic/Section	Applicant's Assessment	Decision Making	Mitigation
	conditions of land use/marine activity, geology and soils within the study area, including reference to agricultural land classifications; • the identification of all land uses and soils within and adjacent to the Main Development Site that may be affected by the construction and operation of the proposed development; • the identification of any other planned activities which could affect land use, geology and soils and the proposed geological disposal infrastructure; • a description of the basis for determining significance of effects arising from the impacts; • an assessment of the likely significant effects of the proposed development on land use, geology and soils taking account of temporary and permanent land-use requirements and site restoration; and • measures, if appropriate, to mitigate potential significant adverse effects on land use/marine activity, geology and soils.		handling strategy in liaison with appropriate stakeholders and in accordance with best practice guidance (see, for example, Defra 2009 Guide for the Sustainable Use of Soils on Construction Sites) to effectively reinstate disturbed areas to their former agricultural use. • Consideration of balance between land use and community effects and mitigation requirements of other topics which may require the use of additional land. • Design site investigation works to avoid designated sites (SSSIs and RIGS) unless no other suitable site is practicable. • Strip topsoil ahead of works. All soil handling, storage and management to be in suitable (dry) conditions and according to relevant guidelines and an appropriate management plan. • Store different soil types separately and minimise duration of storage. • Avoidance of soil compaction on site and while in storage. • Establishment of grass cover on soil mounds. • Seek opportunities for beneficial re-use of drill cuttings to avoid disposal as waste, where practicable in light of commercial, technical and environmental factors.

Draft NPS Topic/Section	Applicant's Assessment	Decision Making	Mitigation
			Construction • See measure identified for site investigation. • Ensure that rights of access for maintenance are secured to any off-site mitigation features. • Ensure that community effects are reduced as far as practicably possible, including the temporary diversion of public rights of way, where required, to maintain the connectivity of the network. • Ensure that potential effects on soils and agricultural land quality are reduced as far as possible. • Avoid sites with existing contamination or, if such a site is selected, advance remediation of the site to remove contamination. Such remediation could provide a positive benefit to a local community. • Careful planning of the works and application of an EMP to prevent contamination and spills. • Ensure that all soils stripped from site to be re-used in landscaping or otherwise beneficially/ sustainably re-used within two years. • Ongoing maintenance of the GDF estate, including any off-site environmental mitigation features (to be covered in the operational phase EMP). **Operation and Closure**

Draft NPS Topic/Section	Applicant's Assessment	Decision Making	Mitigation
			• See measures identified for site investigation and construction. • Preparation of a Site Restoration Strategy including the consideration of after-uses following closure and any impacts on community resources. • Careful preparation of site for reinstatement. • Careful selection of soils for reinstatement of site - source of soils/soil type to be appropriate to the local geology and ecological context and from the nearest available location while avoiding negative effects at the source site. • Soils to be restored onto a stable but permeable substrate, on appropriate gradients, with appropriate aftercare regime in place.

Traffic and Transport (Section 5.12)	• Consideration could be given to providing further guidance on the possible contents of an ES with regard to traffic and transport. Requirements could include:
	  • a description of the traffic-generating aspects of the development proposal leading to impacts on traffic and transport;
	  • a description of the baseline, including the principal modal routes and for the road network, details regarding vehicle movements (using peak, 18 hours and AADT information) and the forecast
		• No recommendations identified.	The mitigation could be revised to be more specific and clearly reflect the key project stages of site investigation, construction and operation and closure, as follows:
			Site Investigation
			• Inclusion of the management and mitigation of any transportation effects in an EMP for drilling surveys.
			• Seek opportunities to use more sustainable transport modes when carrying out preliminary works.
			• Use of access/transport routes to be

Draft NPS Topic/Section	Applicant's Assessment	Decision Making	Mitigation
	changes in traffic movements (without the proposed development); • a prediction of how the transport environment will change with the proposed development; • a description of the basis for determining significance of effects arising from the impacts; • an assessment of the effects of any predicted changes; and • measures to be employed in mitigating the effects of traffic (including a transport plan).		designed to minimise effects of transport on sensitive receptors. • Suppression of dust and mud produced by HGVs though spraying water during dry and windy weather. • Regular sweeping/cleaning of access points to the public road network. **Construction** • See measure identified for site investigation. • Development, implementation and periodic review of a construction phase EMP. • Consideration of other alternatives to road transport (e.g. conveyors) if practicable. • Consideration of potential longer term/wider use of any new transport infrastructure. **Operation and Closure** • See measures identified for site investigation and construction.
Waste Management (Section 5.13)	• Specific reference could be made to National Planning Policy for Waste (2014). • Consideration could be given to the provision of additional guidance requiring that decisions regarding siting and assessments assess: • the likely impact of proposed, non-waste related development on	• The guidance could be more definitive in respect of the circumstances in which the Secretary of State could refuse consent on the grounds of the management of waste. • Clearer direction could be provided with respect to the need for the Secretary of State to consider the impact of waste	The mitigation could be revised to be more specific and clearly reflect the key project stages of site investigation, construction and operation and closure, as follows: **Site Investigation** • During site-based investigations, implementation of waste minimisation and management best practices, in line with published guidelines and an EMP incorporating a Site Waste Management

Draft NPS Topic/Section	Applicant's Assessment	Decision Making	Mitigation
	existing waste management facilities (including their capacity to receive and treat/dispose of waste generated by geological disposal infrastructure), and on sites and areas allocated for waste management; • the requirement for the provision for waste management facilities and their integration with the rest of the development; and • the handling of waste arising from the construction, operation and closure of geological disposal infrastructure to maximise reuse/recovery opportunities, and minimise off-site disposal. • Applicants could be required to provide waste audits. • Applicants could be required to take account of locally adopted waste plans and strategies and engage early with the relevant waste collection and disposal authorities, operators and the Environment Agency. • Greater emphasis could be placed on the need to consider and assess the impact of waste management on the wider environment and communities (with appropriate links to other topics in Section 5 of the draft NPS). • Consideration could be given to the inclusion of a specific reference to the extent to which the arrangements for the management of waste proposed are in	management activities on the environment and communities. • Reflecting National Planning Policy for Waste (2014), reference could be made to the need for the Secretary of State to consider impacts on sites and areas allocated for waste management and the integration of waste management facilities with the rest of a development.	Plan (SWMP). • Consideration of materials usage and waste early to design out waste generation. • Exploration of opportunities for beneficial re-use of drilling cuttings (e.g. re-use as secondary aggregate). **Construction** • See measure identified for site investigation. • The development, implementation and periodic review of a construction phase EMP linked to an integrated waste management strategy. • Implementation of waste minimisation and management best practices, in line with published guidelines. • Design the waste collection/management facilities at site to facilitate the separation and re-use/recycling of waste. **Operation and Closure** • See measure identified for site investigation and construction. • Development, implementation and periodic review of a construction phase EMP incorporating a SWMP. • Explore opportunities for the beneficial/ sustainable reuse of surplus excavated rock removed from site to avoid disposal as waste. • An integrated waste management

Draft NPS Topic/Section	Applicant's Assessment	Decision Making	Mitigation
	accordance with the waste hierarchy.		strategy should consider the options for reuse or recycling of materials wherever possible, including the pre-closure audit, to make the most of the opportunities available at that time. This could include supply of waste materials from a GDF site to construction sites elsewhere.
Water Quality (including Surface and Ground Water Quality and Availability) (Section 5.14)	• Consideration could be given to the provision of additional guidance relating to the scope of any assessment of water quality and resources. Requirements could include: • a description of the surface and ground water environment in the study area that could be affected by the proposed development; • the availability/capacity of water supply and wastewater treatment infrastructure (taking into account water company water resources management plans (WRMPs); • the identification of potential impacts on water resource availability; • the identification of the potential impacts on water quality including in respect of the achievement of River Basin Management Plan (RBMP) objectives; • the impacts on the marine environment (including bathing water quality) together with a requirement for early engagement with the Marine Management Organisation (MMO) (where appropriate) and	• Key considerations to be taken into account by the Secretary of State in determining DCO applications could be made more explicit and include impacts on water resource availability (with reference to water company WRMPs), surface and ground water quality and bathing water (with reference to marine plans), where relevant. • The circumstances in which the Secretary of State would refuse consent due to unacceptable impacts on the water environment could be made more explicit.	The mitigation could be revised to be more specific and clearly reflect the key project stages of site investigation, construction and operation and closure, as follows: **Site Investigation** • Measures identified at paragraph 5.14.5 of the draft NPS could be usefully included at paragraph 5.14.14 alongside reference to the implementation of water efficiency measures and the need to identify/minimise potential abstraction needs and sources (in consultation with regulatory authorities). • Locate potential drilling sites/compounds/access roads etc. to avoid/minimise adverse effects on the water environment. • Ensure watercourse crossing numbers are minimised and flood and pollution control measures incorporated where crossings are required. • Design surface drainage for all relevant surface works incorporating SUDS where possible, with attenuation to greenfield rates of run-off and no increase in run-off volumes where

Draft NPS Topic/Section	Applicant's Assessment	Decision Making	Mitigation
	consideration of marine plans; • the potential effects on aquatic ecology and habitats including a cross-reference to Section 5.4 of the draft NPS; and • the effects of climate change on water resource availability and surface water flooding including cross reference to Sections 5.5 and 5.8 of the draft NPS.		possible. • Protection/ treatment of run-off to avoid siltation of watercourses where necessary. • Establishment of appropriate pollution control measures in line with an EMP. • Drilling specification, including casings and fluid, designed to prevent entry of fluid to groundwater and incorporation of regular monitoring. • Ensure water discharge storage capacity is available on site. • Decommission deep boreholes in line with best practice guidelines and EMP. • Explore opportunities at deep borehole drilling locations to enhance water quality and/or reduce the risk of flooding. **Construction** • See measures identified for site investigation. • Development, implementation and periodic review of a construction-phase EMP. • Construction site and permanent drainage to incorporate SUDS, with surface storage and attenuation to greenfield rates and with no increase in run-off volume where possible. • Establishment of pollution control measures. • Plan works to minimise duration of

Draft NPS Topic/Section	Applicant's Assessment	Decision Making	Mitigation
			dewatering requirements. • Establishment of any treatment facilities early. • Cover excavated rock, especially lower strength sedimentary or evaporite rock, rapidly with soil, to prevent risk of leachate, siltation etc. • Use of stockpile management procedures to prevent risk of leachate and siltation especially lower strength sedimentary rock. • Consideration of appropriateness of rock type for use in bunds and/or specific design requirements for bunds. **Operation and Closure** • See measures identified for construction and site investigation. • Development, implementation and periodic review of an EMP. • Continuous management/ maintenance of water environment mitigation and water management features on site. • All deep boreholes no longer required for ongoing monitoring to be decommissioned in accordance with best practice guidance current at the time. • Site restoration should ensure a similar surface run-off regime to that originally present, allowing for any other changes in the surrounding environment in the intervening decades (unless an

Draft NPS Topic/Section	Applicant's Assessment	Decision Making	Mitigation
			alternative end state is agreed with the local community).

Appendix D
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. These requirements have been highlighted below and a signpost provided to where the requirements are met in this AoS Report.

Objectives and Context	
The plan's purpose and objectives are made clear.	Presented in **Section 2**.
Environmental issues, including international and EC objectives, are considered in developing objectives and targets.	**Section 3** and **Appendix B** identify the sustainability baseline issues and set out the environmental protection objectives and targets and how these are linked to the AoS objectives. AoS objectives are clearly set out and linked to indicators and targets where appropriate. **Section 4** presents the AoS objectives and guide questions. Links to other related plans, programmes and policies are identified and explained. **Section 3 and Appendix B** identify 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.	Technical consultation on an initial AoS Scoping Report took place between 4 August 2015 and 25 September 2015. **Section 1** presents a summary of this consultation. **Appendix D** contains a schedule of consultation responses.
The SEA focuses on significant issues.	Key sustainability issues that could arise from the implementation of the draft NPS have been identified in this AoS Report (see **Section 3**) and **Appendix B**.
Technical, procedural and other difficulties encountered are discussed; assumptions and uncertainties are made explicit.	**Section 4** describes the key difficulties encountered during the preparation of this AoS Report.

Alternatives	
Realistic alternatives are considered for key issues, and the reasons for choosing them are documented.	Potential alternatives are identified in **Section 2** and have been assessed in **Appendix B**. A summary of this assessment is provided in **Section 5**. The reasons for the selection of the draft NPS (as proposed) and the rejection of alternatives are set out in **Section 6**.
The environmental effects (both adverse and beneficial) of each alternative are identified and compared.	The reasonable alternatives to the draft NPS have been assessed in **Appendix B**. A summary of this assessment is provided in **Section 5**.
Inconsistencies between the alternatives and other relevant plans, programmes or policies are identified and explained.	The reasonable alternatives to the draft NPS have been assessed in **Appendix B**. A summary of this assessment is provided in **Section 5**.
Reasons are given for selection or elimination of alternatives.	Potential alternatives are identified in **Section 2.** The reasons for the selection of the draft NPS (as proposed) and the rejection of reasonable alternatives are set out in **Section 6**
Baseline Information	
Relevant aspects of the current state of the environment and their likely evolution without the plan are described.	Refer to **Section 3** and **Appendix B**.
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 **Appendix B**.
Difficulties such as deficiencies in information or methods are explained.	These are stated throughout the report where appropriate and **Section 4.**
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 **Appendix B** and summarised in **Section 5**.
Both positive and negative effects are considered, and the duration of effects	These are set out in **Appendix B** and summarised in **Section**

(short-, medium-, or long-term) is addressed.	**5**.
Likely secondary, cumulative and synergistic effects are identified where practicable.	These are set out in **Appendix B** and summarised in **Section 5**.
Inter-relationships between effects are considered where practicable.	These are set out in **Appendix B** and summarised in **Section 5**.
The prediction and evaluation of effects makes use of relevant accepted standards, regulations and thresholds.	Refer to individual topic chapters in **Appendix B** and **Section 4.**
Methods used to evaluate the effects are described.	These are described in **Section 4**.
Mitigation Measures	
Measures envisaged to prevent, reduce and offset any significant adverse effects of implementing the plan or programme are indicated.	These are set out in **Appendix B,** collated in **Appendix C** and summarised in **Section 5**.
Issues to be taken into account in project consents are identified.	If relevant, these are set out in **Appendix B** and summarised in **Section 5**.
Environmental Report	
Is clear and concise in its layout and presentation.	The layout of the AoS is set out in **Section 1**. The structure was subject to early consultation and review as part of scoping.
Uses simple, clear language and avoids or explains technical terms.	The AoS has been written in plain English as far as the technical nature of the report allows.
Uses maps and other illustrations where appropriate.	Figures and tables have been used throughout the AoS Report and in the appendices where appropriate.
Explains the methodology used.	This is presented in **Section 4**.
Explains who was consulted and what methods of consultation were used.	This is covered in **Section 1**.
Identifies sources of information, including expert judgement and matters of opinion.	References to information sources are provided throughout the report and appendices where appropriate.

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.	A Non-Technical Summary has been provided.
Consultation	
The SEA is consulted on as an integral part of the plan-making process.	Technical consultation on an initial AoS Scoping Report took place between 4 August 2015 and 25 September 2015. **Section 1** presents a summary of this consultation. **Appendix E** contains a schedule of consultation responses. This AoS will be published for consultation alongside the draft NPS.
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.	Technical consultation on an initial AoS Scoping Report took place between 4 August 2015 and 25 September 2015. **Section 1** presents a summary of this consultation. **Appendix E** contains a schedule of consultation responses. This AoS will be published for consultation alongside the draft NPS.
Decision-making and Information on the Decision	
The 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 on this AoS Report).
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 on this AoS Report).
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 on this AoS Report).
Monitoring Measures	
Measures proposed for monitoring are clear, practicable and linked to the indicators and objectives used in the SEA.	Measures are presented in **Section 6**.
Monitoring is used, where appropriate, during implementation of the plan or programme to make good deficiencies in	Details of this are provided in **Section 6**.

baseline information in the SEA.	
Monitoring enables unforeseen adverse effects to be identified at an early stage (these effects may include predictions which prove to be incorrect).	Details of this are provided in **Section 6**.
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).

Appendix E
Schedule of Consultation Responses

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
Copeland Borough Council				
CBC1	1	The Council would expect topic areas to recognise that Copeland Borough Council is currently host to much of the waste which would ultimately be placed within a GDF. The issues, including 'waste and resources' and 'traffic and transport', are not currently reflected in the scope of the appraisal.	Comment noted. Appendix B (Section 10.3) of the AoS Scoping Report includes an analysis of the baseline in respect of radioactive waste. It highlights those sites in the UK where radioactive waste and materials are currently stored and notes that (based on the NDA (2014) 2013 UK Radioactive Waste & Materials Inventory), most waste is produced at Sellafield and the nuclear power stations. Section 11 of Appendix B, meanwhile, concerns traffic and transport including the movement of radioactive waste. Reflecting the baseline information presented in Appendix B, the AoS objectives and guide questions include specific reference to waste management and transportation (see AoS Objectives 10 and 11) and which will ensure that the effects of the draft NPS on these topics are adequately considered. No change to the Scoping Report is considered necessary.	Appendix B (Section 10.3, Section 11)
CBC2	2	The Scoping Report fails to reflect the implications of different elements of the process of developing a GDF. There needs to be clarity around the implications for the topic areas highlighted for different parts of the development process –for example, the	Comment noted. The purpose of the AoS Scoping Report is to provide sufficient information to consultees to enable them to comment on the proposed scope of the AoS of the draft NPS. The	N/A

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
		relationship to borehole exploration during any siting process and boreholing required to inform project design.	subsequent AoS Report will identify, describe and evaluate the likely significant effects of the different aspects of developing geological disposal infrastructure (including deep boreholes and a GDF), using the post scoping consultation revised AoS objectives which cover all of the topics contained in Appendix B (see Section 4.3). This will reflect both deep boreholes as well as subsequent GDF facilities, consistent with the level of detail contained in the draft NPS. Within this context, it is not the role of the AoS Scoping Report to consider the implications of developing a GDF on the topic areas but to instead set out the proposed approach to undertaking the appraisal. No change to the Scoping Report is considered necessary.	
CBC3	2	Scoping would need to reflect the approach to issues relating to the precise inventory of materials to be deposited within a GDF and the approach to retrievability and monitorability. The inventory will be influenced by definitions of waste, by changes in approach to the use of by-products of nuclear process and nuclear energy production – notably spent fuel reprocessing and plutonium reuse. The approach of the NPS and Appraisal of Sustainability relating to the policies of the NPS would potentially change as these issues are taken into account and the approach	Comment noted. The NPS will be used as the primary basis for the examination by the Examining Authority, and for decisions by the Secretary of State, on development consent applications for geological disposal infrastructure that falls within the definition of a nationally significant infrastructure project as defined in the Planning Act 2008.	Appendix B (Section 10.3)

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
		to consideration of a GDF through a Development Consent Order adjusts.	The AoS will appraise the likely environmental and socio-economic effects of the draft NPS, which will include: the overarching objectives of the draft NPS; the development principles; and the generic impacts and siting considerations, including generic mitigation measures. The appraisal will be proportionate to the level of information contained in the draft NPS. Appendix B (Section 10.3) of the AoS Scoping Report refers to the NDA (2014) 2013 UK Radioactive Waste and Materials Inventory and which provides comprehensive and up-to-date information on radioactive waste and materials in stock (as at 1 April 2013). Section 2.3.3 of the AoS Scoping Report and Section 10.5 of Appendix B refer to the 'inventory for disposal' which is the same as that referenced in the 2014 White Paper. Section 10.5 has been expanded to provide a breakdown of the 'inventory for disposal' based on Geological Disposal: The 2013 Derived Inventory (RWM 2015) and which includes current estimates of waste volumes arising from the nuclear new build programme. No further change to the Scoping Report is considered necessary.	

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
CBC4	2	In failing to make specific reference to the current location of legacy wastes, the Scoping Report fails to establish an appropriate context for the appraisal.	Comment noted but not agreed with. Appendix B (Section 10.3) of the AoS Scoping Report includes an analysis of the baseline in respect of radioactive waste. It highlights those sites in the UK where radioactive waste and materials are currently stored and notes that (based on the 2013 UK Radioactive Waste and Materials Inventory), the most waste is produced at Sellafield and the nuclear power stations. In consequence, it is considered that the baseline information and context is appropriate for the purposes of the AoS of the draft NPS. No change to the Scoping Report is considered necessary.	Appendix B (Section 10.3)
CBC5	3	Objectives and guide questions should be amended to reflect the points highlighted above which arise as a specific consequence of materials already being located in Copeland.	Comment noted but not agreed with. The AoS objectives and guide questions set out in the AoS Scoping Report include specific reference to waste management and transportation (see AoS Objectives 10 and 11) and which will ensure that the effects of the draft NPS on these topics are adequately considered. No change to the Scoping Report is considered necessary.	Table 4.3 (Section 4.3), Appendix A, Appendix B, Non-Technical Summary
Above Derwent Parish Council				

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
ADPC1	2	There is reference to multiple plans, acts and other documents in Appendix B yet from these only a single paragraph constitutes a summary baseline. Suggests that it would be helpful to have an agreed level of baseline and to show by countries in separate tables the various directives and policies etc. guiding them. Currently there is no evidence to support the soundness of any of the summary baseline(s).	Comment noted but not agreed with. It is the purpose of the review of plans and programmes contained in each of the Appendix B topic chapters and summarised in Section 3.2 (Table 3.2) to identify the relationship of the NPS with other relevant plans and programmes. This includes the identification of the environmental protection objectives, established at international, community and national level, which are relevant to the NPS to ensure that they can be taken into account in the appraisal. Information on relevant plans and programmes is presented according to the hierarchy: international, European Community, UK and England, Scotland and Wales. In total it contains a review of more than 300 separate directives, acts, plans and programmes. It is the information in Appendix B that provides a sound evidence base for the summary contained within the main body of the AoS Scoping Report. It is the purpose of the scoping consultation to seek comment on the adequacy and appropriateness of this review of plans and programmes. Following responses received by other consultees, it is considered that it presents an up to date review of relevant plans and programmes that is appropriate, relevant and sound.	Appendix B

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
			As set out in Section 3.5 of the AoS Scoping Report, baseline information has generally been sourced from national bodies to enable comparison between baseline information for England, Scotland and Wales. However, in some cases baseline information collected by national bodies differs meaning that data is not directly comparable. The information used in the baseline analysis contained in Appendix B to the AoS Scoping Report has been sourced, so far as is possible, from the most recent datasets available utilising a wide range of authoritative and official sources. In consequence, it is considered that the baseline information is sufficiently robust to inform the appraisal of the draft NPS. No change to the Scoping Report is considered necessary.	
ADPC2	2	In looking at the NPPF specifically there is a concern that the fundamental aspect of Biodiversity and Nature Conservation are not understood in the GDF, Appendix B.	Comment noted but not agreed with. Section 1.1 of Appendix B defines biodiversity through reference to the Convention on Biological Diversity (to which the UK and another 168 countries are signatories). Reference is made to ecosystem services which emphasise the importance of biodiversity and to the linkages between biodiversity and other topics within the AoS. Section 1.2 of Appendix B presents a	Appendix B (Section 1.2)

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
			review of plans and programmes for the topic of biodiversity and nature conservation and summarises some 36 separate directives, statutes, strategies, plans and programmes. As part of the review of plans and programmes, Section 1.2 of Appendix B reproduces paragraph 109, Section 11 of the NPPF (Conserving and enhancing the natural environment) for purposes of clarity and consistency. No change to the Scoping Report is considered necessary.	
ADPC3	2	The summary baseline appears to be the same as the Habitats Directive transposed into UK legislation through the Habitats Regulations. Is this in the correct report or should it be within the HRA of the NPS for Geological Disposal of Radioactive Waste?	Comment noted. The Habitats Directive and transposing UK regulations are relevant to the AoS of the draft NPS. The SEA Directive specifically requires that the AoS includes information relating to any existing environmental problems which are relevant to the plan or programme including, in particular, those relating to any areas of a particular environmental importance, such as areas designated pursuant to Council Directive 2009/147/EC (the 'new wild birds directive'). No change to the Scoping Report is considered necessary.	Appendix B (Section 1.2)
Northern Ireland Environment Agency				

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
NIEA1	General	Anticipates that the transboundary nature of any likely significant adverse effects on the environment of England that would remain after measures envisaged to prevent, reduce and, as fully as possible, offset any significant adverse effects are incorporated into the NPS would be of particular relevance to consider in relation to Northern Ireland.	Comment noted. As detailed in Section 4.2 of the AoS Scoping Report, the AoS will consider the potential effects of the draft NPS in England in addition to Scotland and Wales, given the envisaged potential for a GDF (or deep boreholes) in England to impact upon Scottish and Welsh territories (due to their common borders and geographical proximity). However, any likely significant effects with other areas and states will also be considered. Section 4.2 has been amended to state “Any likely significant with other areas and states will also be considered”.	Section 4.2
NIEA2	General	Would like the SEA Environmental Report to contain a clear statement indicating the opinion (and the reasons for it), of BEIS about whether or not the implementation of the Programme, in combination with any identified measures envisaged to prevent, reduced and, as fully as possible, offset any significant adverse effects on the environment, is likely to have a significant effect on Northern Ireland.	Comment noted. No change to the Scoping Report is considered necessary.	N/A
Environment Agency				
EA1	1	Considers the range of main issues included in the various topic areas to be appropriate for an AoS of the NPS.	Comment noted. No change to the Scoping Report is considered necessary.	N/A

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
EA2	1	The Scoping Report does not address the requirements of the Groundwater Directive (Directive on the protection of groundwater against pollution and deterioration) other than a brief mention of the Directive in Appendix B. Compliance with the Directive requirements to 'prevent' and 'limit' impacts on groundwater will be important and so we suggest that the AoS considers effects relevant to the Groundwater Directive.	Comment noted. Section 5.2 of Appendix B identifies the Groundwater Directive 2006/118/EC as being relevant to the appraisal. It also notes that Article 4(1) of the Water Framework Directive (2000/60/EC) sets out that the objectives for surface water, groundwater, transitional and coastal water bodies. The AoS Objective 5 relates specifically to water quality (including surface and ground water quality and availability) and the achievement of Water Framework Directive (WFD) objectives (and which are taken to include groundwater quality). It also contains a specific appraisal guide question: 'Will the Geological Disposal Infrastructure NPS protect and enhance the quality of surface, groundwater, estuarine and coastal water quality?'. In completing the subsequent appraisal, the requirements of the Groundwater Directive to 'prevent' and 'limit' impacts on groundwater will be considered as part of the response to the guide question which requires consideration of the effects of the draft NPS to 'protect and enhance the quality of groundwater'. No change to the Scoping Report is considered necessary.	Table 4.3 (Section 4.3), Appendix A, Appendix B, Non-Technical Summary

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
EA3	1	The Scoping Report does not mention the wider Water Framework Directive objectives for groundwater, such as the trend objective and that of 'no deterioration'. Suggested that these objectives are addressed in the Appraisal of Sustainability.	Comment noted. The objectives of the Water Framework Directive as they relate to groundwater have been set out in Section 5.2 of Appendix B. Effects on groundwater will be considered in the AoS of the draft NPS as part of the assessment against AoS Objective 5. No change to the Scoping Report is considered necessary.	Appendix B (Section 5.2)
EA4	1	The Scoping Report does not include consideration of the effects arising from supporting infrastructure such as packaging and encapsulation plant(s) for spent nuclear fuel or interim storage facilities for higher activity radioactive wastes. Suggested that these impacts need to be considered because such developments will likely be essential components of infrastructure necessary to support geological disposal. Alternatively, the Scoping Report should make clear what infrastructure is included for consideration in the AoS and what is out of scope.	Comment noted. Section 2.2 of the AoS Scoping Report sets out the definitions for nationally significant infrastructure related to the geological disposal of higher activity radioactive waste, as per Section of 30A of the Planning Act 2008. Section 2.3.2 of the AoS Scoping Report sets out the infrastructure covered by the NPS. Reflecting this definition and the scope of the NPS, the AoS will consider effects related to the construction of a GDF and associated deep boreholes. It will not however, duplicate or anticipate the detailed assessment and appraisal of specific infrastructure elements that will come forward as part of the developers' application for a Development Consent Order for GDF facilities. No change to the Scoping Report is considered necessary.	Section 2.2

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
EA5	1	The baseline information in the Scoping Report for other plans and programmes does not mention the nuclear new build programme. This is an important consideration for the Appraisal because of its impact on the eventual inventory of radioactive wastes requiring geological disposal. Suggested that the Scoping Report should recognise the wider programmes for management of higher activity waste (particularly those managed by the Nuclear Decommissioning Authority and Radioactive Waste Management Ltd) which again will have an impact on the eventual inventory of wastes requiring geological disposal. This should deliver improved transparency and confidence in the inventory requiring disposal.	Comment noted. Reference is made to the nuclear new build programme in Section 10.5 of Appendix B (as it relates to radioactive waste arisings). This reflects the 2014 White Paper which (at paragraph 7.41) states: "With specific regard to waste from the UK's new build programme, the inventory for disposal will include a defined amount of spent fuel and intermediate level waste from a new nuclear build programme to be covered by the GDF siting process that any interested community will begin engaging with. This is in order to provide communities considering hosting a GDF as complete a picture as possible of the waste planned for a GDF in their local area, to allow them to take a fully informed decision on whether to host a facility. The current stated industry ambition for new nuclear development is 16 gigawatt electrical. This is not a Government target and the UK Government is supportive of industry bringing forward plans for further development in future. In that event, the UK Government would need to discuss and agree the disposal of this additional spent fuel and intermediate level waste with any communities participating in the GDF siting process, with a view	Appendix B, Section 10.5, Section 2.4

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
			to either expanding any existing facility development or seeking alternative facilities". Section 2.3.3 has been revised to state that the inventory for disposal will include a defined amount of spent fuel and intermediate level waste from a new nuclear build programme. Section 10.5 has been expanded to provide a breakdown of the inventory for disposal based on Geological Disposal: The 2013 Derived Inventory (RWM 2015) and which includes current estimates of waste volumes arising from the nuclear new build programme. This breakdown is absent from the earlier NDA (2014) 2013 UK Radioactive Waste also referenced in the AoS Report.	
EA6	1	Suggested that lessons might be learnt from experience in Sweden and Finland. These countries will have had to address the requirements of the SEA Directive for their geological disposal programmes.	Comment noted. The experiences of Sweden and Finland in the application of the SEA Directive to proposed geological disposal programmes will be reviewed for any relevance to the UK context and the AoS of the draft NPS in particular. Where appropriate, reference will be included in the AoS Report (see reference 61 in the main report). No change to the Scoping Report is considered necessary.	N/A

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
EA7	2	The disposal inventory identified in the Scoping Report seems to be based on currently defined radioactive wastes (intermediate and high level wastes with some low level waste not suitable for near-surface disposal). Suggested that it needs to be clear as to how it considers other materials such as spent fuel and separated plutonium and uranium that might be declared as wastes in the future.	Comment noted. Appendix B (Section 10.3) notes that the UK Radioactive Waste and Materials Inventory does not include nuclear material that is not currently classified as waste but could be at some point in the future, if it is deemed to have no further use. In Section 10.5, it is noted that the specific types of higher activity radioactive waste (and nuclear materials that could be declared as waste) which would comprise the inventory for disposal in a GDF may include plutonium stocks and uranium stocks. Section 10.5 has been expanded to provide a breakdown of the inventory for disposal based on Geological Disposal: The 2013 Derived Inventory (RWM 2015) and which includes current estimates of waste volumes arising from the nuclear new build programme. Baseline information that is presented in the AoS Report that will accompany the publication of the consultation draft NPS will be reviewed to ensure it reflects an up to date understanding of the inventory for disposal. Any relevance to the NPS will be considered within the appraisal of the draft NPS presented in the AoS Report. No further change to the Scoping Report is	Appendix B (Section 10.3)

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
			considered necessary.	
EA8	2	References to the inventory for disposal are both inconsistent within the document and in relation to other key documents. For example, the inventory discussed in 2.2.3 (and elsewhere in the report) differs to the inventory for disposal set out in the White Paper 'Implementing Geological Disposal'. Similarly, a reference to 'management of higher activity wastes' in Table 4.3 of the Scoping Report is undefined and inconsistent with previous references to the wastes for disposal. A consistent definition of the inventory is important in order to avoid confusion over what might be sent for disposal to any future geological disposal facility in England as well as providing a clear basis for Appraisal.	Comment noted. The AoS Scoping Report refers to the NDA (2014) 2013 UK Radioactive Waste and Materials Inventory and which provides comprehensive and up-to-date information on radioactive waste and materials in stock (as at 1 April 2013). Section 2.3.3 of the Final AoS Scoping Report and Section 10.5 of Appendix B refer to the 'inventory for disposal' which is the same as that referenced in the 2014 White Paper. Section 10.5 of Appendix B of the Final AoS Scoping Report has been expanded to provide a breakdown of the 'inventory for disposal' based on Geological Disposal: The 2013 Derived Inventory (RWM 2015) and which includes current estimates of waste volumes arising from the nuclear new build programme. Table 4.3 of the AoS Scoping Report presents the AoS appraisal objectives and guide questions. The wording referred to in the submission concerns one guide question under AoS Objective 9: "Will the Geological Disposal Infrastructure NPS help to ensure a low carbon design solution to the	Appendix B (Section 10.3), Section 2.2, Table 4.3 (Section 4.3), Appendix A, Appendix B, Non-Technical Summary

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
			management of higher activity wastes, at both construction and operation phases?" This has been amended to read: "Will the Geological Disposal Infrastructure NPS help to ensure a low carbon design solution to the disposal of higher activity radioactive wastes, at both construction and operation phases?"	
EA9	2	In places, the Scoping Report appears to lose focus on higher activity radioactive waste issues. For example, the summary objectives for Waste and Resources relate more to non-hazardous and hazardous waste management. Similarly, Section 10.2 of Appendix B (which provides the context for issues relating to Waste and Resource Use) provides considerable information on plans and legislation which are not relevant to higher activity radioactive wastes. It omits mention of the UK government's White Paper, 'Implementing Geological Disposal' (2014), which is a key reference. It is suggested that the Scoping Report should make clear that the AoS and NPS are about geological disposal of higher activity radioactive wastes and that issues pertinent to these wastes are the focus of consideration.	Comment noted. Whilst the geological disposal of higher activity radioactive waste is clearly a key consideration of the AoS, it is important that the assessment also considers the effects of the draft NPS on other waste types and streams. For example, grant of a DCO allows construction of geological disposal infrastructure, which itself will generate waste. It is therefore appropriate that these hazardous and non-hazardous waste streams are considered. Nonetheless, the summary of key issues presented in Table 3.3 of the AoS Scoping Report includes specific reference to higher activity wastes and which reflects the baseline analysis of radioactive waste management presented in Appendix B (Section 10.3). The 2014 White Paper is included within the review of plans and programmes in Appendix B (Section	Appendix B (Section 10.2, Section 10.3)

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
			10.2) as well as a number of other plans and programmes relevant to radioactive waste. No change to the Scoping Report is considered necessary.	
EA10	2	Suggests that the Scoping Report should include some consideration of seismic activity.	Agreed. Section 4.3 (Appendix B) of the AoS Scoping Report has been updated to include reference to seismicity. Additionally, the following guide question has been included under AoS Objective 4 (see Table 4.3): "Will the Geological Disposal Infrastructure NPS affect induced seismicity?"	Appendix B (Section 4.3), Table 4.3 (Section 4.3), Appendix A, Appendix B, Non-Technical Summary
EA11	3	Considers the AoS objectives and guide questions to be broadly appropriate for appraising the effects of the draft National Policy Statement.	Comment noted. No change to the Scoping Report is considered necessary.	Appendix B (Section 4.3), Table 4.3 (Section 4.3), Appendix A, Appendix B, Non-Technical Summary

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
EA12	3	The following detailed comments are provided in respect of the AoS guide questions: **'Will the Geological Disposal National Policy Statement affect the amount of hazardous and non-hazardous wastes produced?'** The activities which generate the quantities of higher activity radioactive wastes requiring disposal, in particular the decommissioning and clean-up of the UK's legacy nuclear facilities, will also generate quantities of non-radioactive wastes (both hazardous and non-hazardous). However, whilst geological disposal activities themselves will generate some non-radioactive wastes as a result of both the development, operation and decommissioning of facilities, the non-hazardous wastes, such as mining wastes, associated with the development of any such facility may be significant. **'Will the Geological Disposal National Policy Statement affect the capacity of existing waste management systems, both nationally and locally?'** We do not consider that geological disposal itself will affect the capacity. Geological disposal itself should take place within a well-defined process and would, therefore, be an activity quite separate from other forms of waste disposal. It is likely that any processing infrastructure connected with geological disposal would be a bespoke operation. In such circumstances, it would	Comments noted. The responses provided to the guide questions will be considered during the appraisal of the draft NPS as appropriate. However, it should be noted that the AoS is of the draft NPS itself and therefore decommissioning activities are outside the scope of the AoS. No change to the Scoping Report is considered necessary.	N/A

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
		be expected that any waste processing would be carried out, either on or close to the site(s) of production, or alternatively at the point of disposal (although this may increase transportation risks). **'Will the Geological Disposal National Policy Statement maximise re-use and recycling of recovered components and materials?'** Segregation of radioactive and non-radioactive wastes will be an essential part of the process for maximising re-use and recycling of wastes. Each location should have a plan for managing waste to identify the risks and opportunities.		
EA13	General	The Non-Technical Summary and the Introduction to the Scoping Report refer to 'geological disposal facilities and the deep boreholes required to investigate potential sites for these facilities'. In subsequent text, this is truncated to 'geological disposal facilities and related deep boreholes' or similar. We suggest a short footnote to make clear that throughout the document 'deep boreholes' are for site investigation only and do not refer to any proposals for deep borehole disposal of radioactive waste. It would be clearer if the same terminology regarding geological disposal facilities and deep boreholes were used throughout the document.	Agreed. A footnote has been included in Non-Technical Summary and Section 1.1 of the AoS Scoping Report clarifying the nature of deep borehole development that would be covered by the NPS.	Non-Technical Summary, Section 1.1
EA14	General	Section 2.3 of the Scoping Report discusses reasonable alternatives but the arguments about why the suggested	Comment noted. Section 2.3 of the AoS Scoping Report sets out the requirements of the SEA	Section 2.4

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		alternatives are considered 'reasonable' are not clear. The proposed alternatives seem to be variations on the National Policy Statement that partially address the question of 'where should it go?' We suggest a clearer explanation of the suggested alternatives would be helpful. In addition, we suggest that it would be more transparent to present a clear summary of CoRWM's work to show that reasonable alternative disposal options have been considered at an appropriate level of detail.	Directive with regard to reasonable alternatives to the NPS. A number of example reasonable alternatives are presented and the text also outlined briefly those aspects that were not proposed to be considered within the subsequent AoS, which included the policy decision with regard to disposal, reaffirmed in the 2014 White Paper. This was presented in anticipation of the more detailed review of alternatives to be contained in the subsequent AoS Report. This section of the AoS Report will include reference to the work carried out by the independent Committee on Radioactive Waste Management (CoRWM). Section 2.4 of this Final Scoping Report includes reference and a link to the work of the CoRWM. No change.	
EA15	2	The review of the List of Wastes noted in Section 10.2 of Appendix B has been completed. The environment agencies have published their technical guidance WM3: Waste Classification, which provides guidance on classification and assessment of waste.	Comment noted. Reference to the List of Wastes having been reviewed has been included in Appendix B.	Appendix B (Section 10.2)
EA16	2	There are no summary objectives set out for biodiversity and nature conservation in Table 3.2 of the Scoping Report (page 48) – the wording is the same as in Table 3.3 (page 60), which sets	Agreed. Table 3.2 has been amended to include a summary of key objectives identified from the review of plans and programmes for biodiversity and nature	Table 3.2 (Section 3.2)

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
		out a summary of key issues.	conservation contained in Appendix B.	
EA17	2	Suggested that the list of Environment Impact Assessment specific measures listed in Box 4.1 of the Scoping Report could include minimisation of radioactive discharges to air and water and disposal of secondary solid waste to land.	Comment noted. The mitigation measures identified in Box 4.1 of the AoS Scoping Report are indicative only. However, the proposed measure "minimisation of radioactive discharges to air and water and disposal of secondary solid waste to land" has now been included.	Box 4.1 (Section 4.4)
EA18	2	Table 4.6 mentions 'Examples of a secondary effect of the draft Geological Disposal National Policy Statement would include the materials (and embedded carbon) used in the development of the storage facility (italics added), or health effects of changes to air quality associated with transport.' If the text is referring to a geological disposal facility, it should refer to a disposal facility. If not, it should make clear what storage facility is being addressed.	Comment noted. The term 'storage facility' has been amended to read 'geological disposal facility'.	Table 4.6 (Section 4.4).
EA19	General	The first sentence of 'Geological Disposal – An Overview' refers to 'a legacy of higher activity radioactive waste and material' but does not define what is meant by material. This is the only reference to radioactive material in the Scoping Report other than a reference to transport of radioactive material (Scoping Report, Table 3.3, page 68). It should be made clear what the radioactive material is and whether it constitutes part of the inventory for disposal in a geological disposal facility.	Comment noted. The reference to 'material' has been removed from the revised AoS Scoping Report.	Section 1.3.
EA20	2	In Table 3.3 of the Scoping Report, the statement under Waste	Agreed. To avoid confusion, the statement "The	Table 3.3

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
		and Resources that "The total amount of waste produced each year is likely to decrease in coming years" is potentially misleading. The rate at which radioactive waste will arise will depend on progress with decommissioning of redundant facilities and on decisions on the scale of the new nuclear reactor programme. In the same section of the table, it is unclear how the reference to the capacity of the Low Level Waste Repository relates to geological disposal or management of higher activity radioactive waste.	total amount of waste produced each year is likely to decrease in coming years" has been amended so that it refers specifically to municipal and commercial and industrial waste streams (and not radioactive waste). The reference to the capacity of the Low Level Waste Repository in Appendix B has been removed.	(Section 3.4), Appendix B (Section 10.3)
EA21	General	The meaning of the first sentence of the final paragraph on page 85 of the Scoping Report is very unclear. It reads 'Through the Appraisal of Sustainability of the constitute elements of the draft National Policy Statement, the appraisal of the cumulative effects of the collective implementation of the draft National Policy Statement will be completed.' This text needs to be better explained.	Agreed. Section 4.4 has been amended to clarify what is meant by the appraisal of the cumulative effects of the draft NPS.	Section 4.4.
EA22	3	The term 'severance of communities' is used in Table Non-Technical Summary 2 (Scoping Report, page 22) and elsewhere without any explanation of what this means.	Comment noted. Severance refers to the separation of communities by development such as roads. This has been highlighted in Table 4.3.	Table 4.3 (Section 4.3), Appendix A, Appendix B, Non-Technical

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
				Summary
Historic England				
HE1	1	We note that 'Cultural Heritage' is identified as an AoS topic being described as 'Consideration will need to be given to the potential effects on the historic environment, including cultural heritage resources, historic buildings and archaeological features'. We recommend this should be further strengthened by also making a specific reference to the potential effect on their setting as set out in the NPPF (2012).	Agreed. Table Non-Technical Summary 1 has been amended to refer to the setting of cultural heritage assets.	Table Non-Technical Summary 1 (Non-Technical Summary)
HE2	1	Similarly, the importance of setting should be included under the 'Landscape and Townscape' topic which is described as 'Consideration will need to be given to the potential effects on the quality and attractiveness of landscapes and townscapes, as well as on visual amenity and public access to open spaces'.	Agreed. Table Non-Technical Summary 1 has been amended to refer to the setting of assets.	Table Non-Technical Summary 1 (Non-Technical Summary)
HE3	2	It is not clear how the AoS links have been identified. For example, the topics/objectives relating to flood risk and coastal change, noise, climatic factors, and traffic and transport are also likely to be of relevance to both cultural heritage, and landscapes and townscapes. This could be further considered under the appropriate headings in Appendix B 'Baseline and Contextual Information' where our guidance on 'Climate Change and the	Comment noted. It is agreed that there are linkages between the topics to be considered as part of the AoS of the draft NPS and Appendix B has sought to identify these where appropriate, although this is not intended to be exhaustive. Whilst the baseline information and AoS objectives	Appendix B, Section 3.1

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
		Historic Environment' is referenced.	are presented by topic, the appraisal of the draft NPS will consider linkages between the topics as appropriate (for example, the potential impacts of vehicle movements on heritage assets and landscape character). This has been reflected in Section 3.1 of this Final Scoping Report.	
HE4	2	Similarly in Appendix B 'Cultural Heritage', the recently published Historic England Good Practice Advice Notes on 'Managing Significance in Decision-Taking in the Historic Environment' and 'The Setting of Heritage Assets' could be usefully included. Although the 'National Planning Policy Framework' is considered under 'Landscape and Townscape', the 'National Planning Policy Guidance' has been omitted together with registered battlefields when considering registered landscapes in England.	Comment noted. The plans and programmes referred to in this response have now been included in the review of plans and programmes contained in Appendix B (Section 12.2). Reference to National Planning Practice Guidance in respect of landscape and townscape has been included in Appendix B (Section 13.2). Registered battlefields are already identified in Section 12.3 of Appendix B.	Appendix B (Section 12.2, Section 12.3, Section 13.2)
HE5	3	The AoS objectives and guide questions should make specific reference to setting. We also suggest combining the second and third rows under 'Reasoning' so the content reflects all aspects of the historic environment.	Agreed. AoS Objective 12 has been amended to read: "To protect and where appropriate enhance the historic environment including cultural heritage resources, historic buildings and archaeological features and their settings". The guide question "Will the Geological Disposal	Table 4.3 (Section 4.3), Appendix A, Appendix B, Non-Technical

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
			Infrastructure NPS affect designated or locally-important archaeological features?" has been amended to read: "Will the Geological Disposal Infrastructure NPS affect designated or locally-important archaeological features or their settings?" Appendix A and Appendix B have been amended to combine the 'reasoning' as suggested in this response.	Summary.
HE6	3	The 'Illustrative Guidance for the Assessment of Significance for Cultural Heritage' requires careful review – 'Positive' should include locally important cultural heritage features, 'Neutral' should mention setting and 'Negative' should include locally important cultural heritage features.	Agreed. The illustrative guidance set out in Appendix A and Appendix B has been revised in accordance with this response.	Appendix A, Appendix B
HE7	3	Under 'Landscape and Townscape the objectives/guide questions should reference setting when considering protected/designated landscapes and landscapes/townscapes.	Agreed. The guide questions 'Will the Geological Disposal Infrastructure NPS affect protected/designated landscapes?' and 'Will the Geological Disposal Infrastructure NPS affect the intrinsic character of local landscapes or townscapes?' have been amended to refer to setting.	Table 4.3 (Section 4.3), Appendix A, Appendix B, Non-Technical Summary
HE8	3	The 'Illustrative Guidance for the Assessment of Significance for	Agreed. The illustrative guidance set out in	Appendix A,

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
		Landscape and Townscape' requires careful review – 'Significant Positive', bullet one includes setting, bullet two only refers setting and not direct impacts, 'Positive' bullet one include setting, bullet two only refers to setting and not direct impacts, 'Neutral' could state the option would not have any effect on statutorily-designated landscapes, local landscapes, townscapes and their setting, 'Negative' bullet one and two include setting and 'Significant Negative' bullet one and two include setting.	Appendix A and Appendix B has been revised in accordance with this response.	Appendix B
Historic Scotland				
HS1	General	Agrees that there is potential for significant effects on Scotland's historic environment, and welcomes that this has been scoped this into the assessment.	Comment noted. No change required.	N/A
HS2	General	Is content with the scope of assessment, level of detail and approach to assessment that is outlined in the Scoping Report in relation to the historic environment.	Comment noted. No change required.	N/A
HS3	2	The following comments are made in respect of the review of plans and programmes: • The Department for Culture, Media and Sport White Paper, Heritage Protection for the 21st Century (2007) and Planning (Listed Buildings and Conservation Areas) Act 1990 are not relevant to Scotland. • Section 1 of the Protection of Wrecks Act 1973 was repealed	Comment noted. The review of plans and programmes contained in Appendix B (Section 11.2) has been revised to reflect the amendments suggested in the consultation response.	Appendix B (Section 11.2)

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		in Scotland on 1 November 2013.
		• Historic Marine Protected Areas have replaced use of Section 1 of the Protection of Wrecks Act 1973 for designation of historic shipwrecks in Scottish territorial waters.
		• The Ancient Monuments and Archaeological Areas Act 1979 is the key piece of legislation relating to scheduled monuments in Scotland, rather than the Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997.
		• Scottish Historic Environment Policy (2009) was superseded in 2011 by a revised version which takes account of:
		  • the marine historic environment policy (which was subject to a full public consultation in 2008);
		  • the provisions of the Marine Scotland Act 2010; and
		  • the provisions of the 2011 Act.		

HS4	General	A new lead body for the historic environment- known as Historic Environment Scotland (HES) for the purposes of legislation- has been created.	Comment noted. Reference to Historic Scotland has been amended as per this response.	All sections.
HS5	2	In addition to the national designations listed, Scotland also has 7 Historic Marine Protected Areas and 39 Inventory Battlefields. The number of World Heritage Sites has increased to 6 with the recent inscription of the Forth Rail Bridge.	Comment noted, Appendix B (Section 12.3) has been amended as per this response.	Appendix B (Section 12.3)

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
Department of Environment, Food and Agriculture (Isle of Man Government)				
DEFA1	1	Given the uncertainty on the geographical limitations (of the NPS), the Department would welcome some clarification as to the geographic scope of the AoS. The Department of Environmental, Food and Agriculture (DEFA) considers that the draft AoS document does not provide sufficient information to allows us to judge how or if a potential impact on the Isle of Man and its maritime area and fisheries resources, would be included in any process to assess potential deleterious effects from GDF development activities in the Irish Sea area.	Comment noted. It is considered that the information contained in the AoS Scoping Report is sufficient for the purpose of providing statutory consultees (as per requirements of SEA regulation 12 (5) and (6)) with sufficient information on the proposed scope of the appraisal. The AoS will consider the potential effects of the draft NPS in England in addition to Scotland and Wales, given the envisaged potential for a GDF (or deep boreholes) in England to impact upon Scottish and Welsh territories (due to their common borders and geographical proximity). However, if any likely significant effects with other areas and states are determined, these will also be identified, described and evaluated. Section 4.2 has been amended to state “Any likely significant with other areas and states will also be considered”. No change.	
Natural England				
NE1	General	We consider that the legibility of the document could be improved. For instance at 16 pages the Non-Technical summary	Comment noted. The Non-Technical Summary provides an overview of the main contents of the	Non-Technical

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
		is overly long and simply repeats much of what is included in the introductory section of the document.	AoS Scoping Report, in accordance with the requirements of the SEA Regulations. It is intended to provide sufficient information to be read as standalone document. In this context, it is unclear how the Non-Technical Summary could be condensed. However, the need for brevity is recognised and the AoS Report will be accompanied by a short synopsis.	Summary
NE2	General	Sections 3 and 4 of the report which contain the bulk of the documentation are laid out in tabular form, with little explanation or justification provided for the topics / sources / options chosen. We would welcome further explanation in these sections.	Comment noted but not agreed with. Section 3.1 of the AoS Scoping Report sets out that the topics detailed in the SEA Directive have formed the basis for the topics considered in the AoS Scoping Report. In Section 4.3, meanwhile, the justification for the selection of the AoS objectives and guide questions is provided. No change to the Scoping Report is considered necessary.	Section 3.1, Section 4.3
NE3	General	The main assessment contains little cross referencing to the Government's 2014 White Paper on Geological Disposal of Nuclear Waste, which makes it unclear why certain options have been selected and alternative means of disposal have been rejected.	Comment noted but not agreed with. At Section 1.3 and Section 2.3, the AoS Scoping Report sets out that the Government's policy is for the long-term management of higher activity waste by way of geological disposal, as set out in the 2014 White Paper and include clear cross reference and links to	Section 1.3, Section 2.4

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			the 2014 White Paper. In consequence, the AoS will not revisit alternatives to geological disposal itself (and which have already been considered in the work carried out by the independent Committee on Radioactive Waste Management (CoRWM). No change to the Scoping Report is considered necessary.	
NE4	1	Natural England supports the identified topic areas and the justification provided for the inclusion of each area of assessment.	Comment noted.	Section 3.1
NE5	1	The current wording on the assessment of effects on biodiversity (Table Non-Technical Summary3) "A description of effects of the Geological Disposal NPS principle of assessment under consideration will be provided here, with reasoning and justification included" is unclear. This sentence should be reworded, to make clear that it is the effects of the NPS on the environmental topics (e.g. biodiversity) that are being assessed and not the 'principle of assessment' (to make clear that this relates to the policy document, not the subsequent individual applications).	Comment noted but not agreed with. The wording in Table 3 Non-Technical Summary and Table 4.4 is illustrative only and is intended to provide an example of how a component of the draft NPS (in this case the principles of assessment) would be appraised. No change to the Scoping Report is considered necessary.	Table Non-Technical Summary3 (Non-Technical Summary) and Table 4.4 (Section 4.4)
NE6	2	The Scoping Report sets out a wide range of baseline and context information for the environmental objectives, however Natural England believes that a few of these sources could be	Comment noted. The NCAs are referenced (including a weblink) in a revised Section 1.3 (Appendix B) of the Final AoS Scoping Report.	Appendix B (Section 1.3)

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
		improved or updated. Baseline data for Biodiversity and Landscape could be improved by referencing data contained with the National Character Areas (NCAs).		
NE7	3	The summary objectives for Biodiversity and Landscape and Townscape identified in Table 3.2, are not actual objectives, but are trends identified from various review sources. We consider that the objectives for Biodiversity and Landscape need to be rewritten in line with Governments stated national and international objectives for Biodiversity and Landscape (e.g. to protect and enhance biodiversity paragraphs 109 & 118 of the NPPF). We would recommend the following source materials. For Biodiversity, Biodiversity 2020, for Landscape, the European Landscape Convention and statements of opportunity contained within individual National Character Area Statements.	Agreed. Table 3.2 has been revised to include a summary of key objectives identified from the review of plans and programmes for biodiversity and nature conservation contained in Appendix B.	Table 3.2 (Section 3.2)
NE8	3	Under the Objective for Water, we would request that water quality is assessed in terms of its impact on aquatic habitats and the biodiversity that it supports.	Comment noted. It is assumed that this response relates to the summary of objectives arising from the review of plans and programmes contained in Table 3.2 (Section 3.2). This table already identifies the following objective: "To improve quality of the UK water environment and the ecology which it supports". No change to the Scoping Report is considered necessary.	Table 3.2 (Section 3.2)

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
NE9	3	Topic 7, Air, identifies an objective "To improve air quality by reducing the impact of air pollution on human health and ecosystems". In regard to air quality, we consider that there should be a specific objective for the reduction of air pollution and its impact on biodiversity (Natural England's research papers on 'Air Quality' should help to identify where air pollution is having specific impacts on protected habitats).	Agreed. This comment concerns the summary of objectives arising from the review of plans and programmes contained in Table 3.2 (Section 3.2). The following additional objective under 'Air' has now been included (and the existing objective amended as appropriate): "To improve air quality and reduce the impact of air pollution on biodiversity".	Table 3.2 (Section 3.2)
NE10	3	Topic 13, Objectives for Landscape and Townscape does not identify the UK's responsibilities for the protection of Landscapes under the European Landscape Convention, nor does it identify an objective for the protection of nationally designated landscapes (National Parks, the Broads and Areas of Outstanding Natural Beauty), or for the protection of Heritage Coasts. We believe that this should be included in the objectives to reflect the importance of these designations as set out in the National Planning Policy Framework and other National Policy Statements.	Agreed. Table 3.2 has been amended to include a summary of key objectives identified from the review of plans and programmes for landscape and townscape contained in Appendix B.	Table 3.2 (Section 3.2)
NE11	3	Table 3.3 sets out "Key Issues Relevant to the NPS", which for issues such as "2. Population, Economics and Skills", identifies the direct impacts that the implementation of the NPS will have on the topic area, e.g. "In relation to economic development, a GDF is estimated to generate an additional £50-£200 million indirect and induced expenditure in the economy in an average	Comment noted but not agreed with. Table 3.3 sets out "Key Issues Relevant to the NPS", which contains a summary of relevant trend information that will provide the context for the subsequent appraisal. At the time of writing, further quantifiable information	Table 3.3 (Section 3.4)

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
		year. This equates to a present value benefit of £1.8 to £6.7 billion over the lifetime of the project". For the issues of Biodiversity, Water Quality, Noise and 'Landscape and Townscape', the 'Key Issues' identified, are simply national trends that bear no relation to the direct impacts of the implementation of the NPS for Geological Disposal. The NPS will have a range of direct impacts in terms of disturbance impacts from construction and transport movements, use of extracted materials, etc. that are quantifiable and should be presented in relation to the assessment. The current summary of key issues presents an uneven treatment of the environment, compared to the socio-economic impacts identified.	relating to the potential effects of a GDF was not available. The appraisal of the draft NPS will reflect quantitative information where this becomes available. Where numerical information is not available, the appraisal will be based on professional judgement and with reference to relevant legislation, regulations and policy. No change to the Scoping Report is considered necessary.	
NE12	3	Table 4.2 sets out the range of timescales that the impacts of the NPS will need to be assessed over. It is clear from this table that in the short term, impacts will only occur in relation to site identification and the creation of boreholes. It would seem necessary, therefore, that the AoS should look at the specific impacts of borehole creation and pre-construction investigation, in order to identify short-term impacts (as separate from medium- and long-term impacts). The creation of boreholes is not currently addressed in the assessment topics.	Comment noted. It is fully intended for the AoS to consider the short-term effects of the draft NPS including generic impacts associated with borehole development (being part of the infrastructure to be covered by the NPS). This is detailed in Table 4.2. No change to the Scoping Report is considered necessary.	Table 4.2 (Section 4.2)
NE13	3	Table 4.3 sets out the Proposed Guide Questions for each of the objectives. In relation to Biodiversity, the NPPF contains a commitment to protect and/or enhance species and habitats	Agreed. The following additional guide question has been included in Table 4.3 under AoS Objective 1: "Will the Geological Disposal Infrastructure NPS	Table 4.3 (Section 4.3), Non-

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
		identified in lists prepared in relation to S.41 of the Natural Environment and Rural Communities (NERC) Act. We would therefore welcome a guide question that seeks to assess this impact (as the current guide question does for European sites).	protect and/or enhance priority species and habitats?"	Technical Summary, Appendix A, Appendix B
NE14	3	Suggested that guide question 1 is extended to address not just internationally designated habitats, but also species to which the UK Government has identified a commitment to protect and enhance.	Comment noted but not agreed with. The AoS Objective 1 guide questions are: • Will the Geological Disposal Infrastructure NPS protect and/or enhance internationally designated nature conservation sites e.g. SACs, SPAs and Ramsar Sites? • Will the Geological Disposal Infrastructure NPS protect and/or enhance nationally designated nature conservation sites e.g. SSSIs? • Will the Geological Disposal Infrastructure NPS affect animals or plants including protected species? These are considered sufficiently comprehensive to identify and address any effects on and internationally and nationally important conservation sites and species. No change to the Scoping Report is considered necessary.	Table 4.3 (Section 4.3), Non-Technical Summary, Appendix A, Appendix B

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
NE15	3	For the topics of air, water and noise we would request that guide questions specifically identify the effects of the NPS on these receptors and the habitats and species that are vulnerable to change (which can be at very different thresholds to acceptable change for impacts on human receptors).	Comment noted but not agreed with. The guide questions for air, water and noise are intentionally inclusive in their current wording to ensure that the likely significant effects on all sensitive receptors, whether human or flora or fauna are identified, described and evaluated. No change to the Scoping Report is considered necessary.	Table 4.3 (Section 4.3), Non-Technical Summary, Appendix A, Appendix B
NE16	3	Table 4.5 identifies the scoring that will be used to respond to the guide questions, and where an issue can be classified as "uncertain". We would welcome further clarification on where "uncertain" will be used to respond to a guide question, the current text states that "From the level of information available the effect that the option would have on this objective is uncertain". For a number of topic indicators it may be necessary to aggregate data information sources and we would welcome a commitment that the assessment questions will not rely solely on primary data sources published on the individual topic. We consider that where it is found that an outcome in "uncertain", that the objective and guide question, should be revisited, in order to enable the responsible authority to make final decisions on the NPS, based on the best available information and the clearest identification of trends that can be made, we would welcome revision to the wording to reflect this commitment.	Comment noted. The SEA Directive requires that the AoS is based on information that can reasonably be required, taking into account current knowledge and methods of assessment (Article 5(2) of the SEA Directive). The AoS Scoping Report uses information from a variety of sources including, amongst others, the Department for Environment, Food and Rural Affairs (Defra), BEIS, the Environment Agency, Natural England, Historic England, the Office for National Statistics, Welsh Government, Natural Resources Wales and the Scottish Environment Protection Agency. This information is publicly available, credible, accurate, current and verifiable. It is considered sound and appropriate for the purpose of completing the AoS. There may be instances where, based on the	Table 4.5 (Section 4.4), Non-Technical Summary

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
			information available, the AoS concludes an uncertain effect. This is particularly pertinent given the extended timescales for considering the potential effects of the draft NPS, as detailed in Table 4.2 of the AoS Scoping Report. In such cases, the AoS Report will record the effect as being uncertain. It is not the intention to revisit the AoS where uncertainties have been identified. Instead, measures will be proposed to mitigate the uncertainties identified where possible or to monitor them during the implementation of the NPS. This approach is consistent with UK Government guidance on SEA No change to the Scoping Report is considered necessary.	
NE17	3	In the example provided within Table 4.5 Biodiversity and Nature Conservation, a significant positive addresses potential impacts to international, national and local biodiversity, however a significant negative only relates to international and national sites and species (and specifically their interest features or long-term condition). We consider that this is a disparity and that a significant negative could result from the loss of a local interest feature (and not just a notified interest feature). We would welcome further clarification in regard to the assessment status.	Comment noted but not agreed with. The AoS will identify the likely significant effects of the draft NPS, which is a national level planning policy document. The definition of what constitutes a likely significant effect, whilst illustrative, reflects this national level. Reference to international and national sites is considered appropriate and proportionate to this scope and level of appraisal. In accordance with the illustrative guidance, any local effects on biodiversity	Table 4.5, Appendix A, Appendix B

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
			will be assessed as minor. To ensure balance in the appraisal of positive and negative effects, the guidance on significance has been revised.	
Nuclear Decommissioning Authority (NDA) & Radioactive Waste Management Ltd (RWM)				
NDA1	1	The AoS, as a national-scale appraisal, should consider a broad range of topics and issues as is proposed. However, it is not obvious that an NPS which sets out the policy for deep boreholes for site characterisation and a GDF has the potential to have significant effects on a number of the key issues identified in the AoS Scoping Report. If the AoS Report had a particular focus on the issues relevant to the nature and scale of the development that the NPS is providing policy and guidance for, it would more effectively influence and then assess the proposed NPS as well as assist members of the public and consultees in commenting on the NPS. It would therefore be useful if there was greater clarity in the AoS Report as to why issues have been identified as key to the appraisal of the NPS and reasonable alternatives.	Comment noted. As set out in Section 3.1 of the AoS Scoping Report, Annex I of the SEA Directive requires that an appraisal should include information on the likely significant effects on the environment, including on issues such as: biodiversity; population; human health; fauna; flora; soil; water; air; climatic factors; material assets; cultural heritage, including architectural and archaeological heritage; and landscape. This requirement has informed the identification of topics to be considered as part of the AoS. The range of topics included in the AoS of the draft NPS does not mean that the appraisal will become 'diluted' or less effective. It is important that each topic is given appropriate consideration in the assessment and in accordance with the SEA Directive, the AoS will seek to identify the likely significant effects of the draft NPS in the context of all of the topics identified.	Section 3.1

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
			No change to the Scoping Report is considered necessary.	
NDA3	1	The AoS Report would benefit from further clarification of the assumptions that are being made in the NPS as to what a deep borehole project or GDF would comprise. For example, will the NPS apply to any local transport links that may have to be developed to support implementation of a GDF? Whether such development is part of the nationally significant infrastructure project itself or associated development, the NPS may still be able to set policy for all such development (we note that this is the approach taken in certain of the Energy NPSs). Such decisions on the scope of the NPS could potentially influence a number of the assessment questions set out in Appendix A.	Comment noted. The AoS Scoping Report reflects the information that is currently available on the scope of the NPS, as set out in the Planning Act. However, this contextual information will be refined as part of the preparation of the AoS Report once further detail in respect of the content of the draft NPS is available. No change to the Scoping Report is considered necessary.	Section 2.2
NDA4	1	As part of the effects arising from implementing geological disposal, we suggest that the appraisal should explicitly consider the inherent sustainability benefits of geological disposal, for example it being assessed as: 'the best available approach for the long-term management of the UK's legacy of higher activity radioactive wastes'; as well as an enabler for the decommissioning and clean-up of existing nuclear sites. The appraisal could also consider the sustainability benefits of an approach to siting a GDF that is based on the willingness of local communities to participate in the siting process. These factors could then also be considered in the context of reasonable	Comment noted. However, it is considered that the inclusion of specific objectives or guide questions relating to the sustainability benefits of geological disposal would reflect the policy objective of the NPS and would, therefore, not be appropriate for inclusion in the AoS appraisal framework. No change to the Scoping Report is considered necessary.	N/A

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
		alternatives.		
NDA5	1	It would be of benefit if the issues relevant to the following were clearly distinguished: 1) deep boreholes only; 2) GDF only; and 3) both deep boreholes and GDF. The two categories of nationally significant infrastructure project that the NPS (and therefore the AoS) will cover are different in nature, scale, timescales and potential effects. It is not obvious that the key issues for these types of development would be the same. For example, it is not clear that climate change adaptation and coastal change would be key issues in the consideration of deep boreholes. Therefore we suggest that the AoS Report should distinguish more clearly between the different categories of nationally significant infrastructure project set out above.	Comment noted. As highlighted in Table 4.2 of the AoS Scoping Report, the appraisal will consider the short-term effects of the draft NPS (including site identification, boreholes and initial construction of GDFs), medium-term effects (GDF operation (including ongoing construction of further underground waste vaults) and long-term effects (closure and monitoring). This reflects the requirements of the SEA Directive. Whilst it is not the intention to appraise separately deep borehole and GDF construction, the effects of both types of development will be fully considered and where there are likely to be significant effects on the AoS objectives this will be recorded in the AoS Report. No change to the Scoping Report is considered necessary.	Table 4.2 (Section 4.2)
NDA6	1	We would suggest there is a need for a more general consideration of how radiological protection and radioactive waste management issues are addressed in the AoS Report. As described in our response to Question 2, these areas do not appear to be as clearly described in the AoS Scoping Report as non-radioactive sustainability issues are.	Comment noted. However, it is considered that the inclusion of specific objectives or guide questions relating to the sustainability benefits of geological disposal would reflect the policy objective of the NPS and would, therefore, not be appropriate for inclusion in the AoS appraisal framework.	

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
			No change to the Scoping Report is considered necessary.	
NDA7	2	The following suggestions could be considered to further clarify the context of the appraisal: Making it clear at the beginning of the AoS Report and in the Non-Technical Summary that the AoS relates to the NPS, rather than specific deep boreholes or GDF proposals.	Agreed. Whilst the AoS Scoping Report identifies those elements of the draft NPS that are to be appraised (see Section 4.4), the Non-Technical Summary and Section 1.1 could make explicit that the AoS will not consider specific proposals. The Non-Technical Summary and Section 1.1 have therefore been revised accordingly.	Section 1.1, Non-Technical Summary
NDA8	2	Including a fuller explanation in the AoS Report of the relationship between the Appraisal of Sustainability and the National Policy Statement; and the Appraisal of Sustainability and Habitats Regulations Assessment document. This could build on the description in Figure 1.2. This could also usefully explain the role of the NPS in guiding the examination of future Development Consent Order applications under the Planning Act 2008.	Comment noted. Section 1.4 of the AoS Scoping Report describes the relationship between the AoS process and development of the NPS. Section 1.1, meanwhile, sets out the purposes of the AoS in the context of the NPS. It is not considered that further information is needed in this regard. Section 1.1, Section 1.3 and Section 2.2 of the AoS Scoping Report make clear that the purpose of the NPS will be to guide the Secretary of State, Planning Inspectorate and developer of the site in the consideration of any applications for development consent in relation to geological disposal infrastructure, including deep boreholes. However, further (general) information relating to role of NPSs	Section 1.1, Section 1.3, Section 1.4, Section 1.5, Section 2.2

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
			has been provided in Section 2.1, reflecting this response. Further information regarding the relationship between the AoS and HRA processes has been included in Section 1.5.	
NDA9	2	The AoS Report could provide more contextual information on the relationship between the planning process for nationally significant infrastructure projects and environmental and nuclear regulatory permitting processes. This could include contextual information on national and international consultation as part of permitting processes, for example, Article 37 submissions to the European Commission.	Agreed. Further information relating to the relationship between the planning process for nationally significant infrastructure projects and environmental and nuclear regulatory permitting processes has been included in Section 2.2.	Section 2.2
NDA10	2	Providing further background information on geological disposal and the role of deep boreholes in site characterisation and selection, in the AoS Report itself would be useful. This could include more information from the 'Implementing Geological Disposal' White Paper explaining the framework for implementing geological disposal. In describing the role of CoRWM in informing the development of Government Policy, the AoS Report could refer explicitly to CoRWM's position with respect to waste from new nuclear power stations and further consideration of this by BEIS and CoRWM following CoRWM's 2006 advice on legacy waste.	Agreed. Further information relating to geological disposal and the role of deep boreholes has been provided in Section 2.2. At Section 1.3 and Section 2.3, the AoS Scoping Report currently sets out that the Government's policy is for the long-term management of higher activity waste by way of geological disposal, as set out in the 2014 White Paper and to which reference is made. Section 2.4 of this Final Scoping Report includes reference and link to the work of the CoRWM. In this context, it is not considered necessary for the AoS to revisit (or summarise	Section 1.3, Section 2.2, Section 2.3

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
			further) the work carried out by CoRWM. No change to the Scoping Report is considered necessary.	
NDA11	2	The baseline information on radioactive waste within the Scoping Report is based upon the UK Radioactive Waste Inventory and provides information on all categories of radioactive waste, including low level waste. In a number of areas, trends are identified which relate primarily to low level waste that is not intended for geological disposal. We would suggest that the AoS Report focusses specifically on the inventory intended for geological disposal that is set out in the 'Implementing Geological Disposal' White Paper. The wider inventory information that is currently presented could result in readers misunderstanding the scale of a GDF and also the relevance of the baseline information to the appraisal of the NPS.	Comment noted. The NDA (2014) 2013 UK Radioactive Waste and Materials Inventory has been used in the AoS Scoping Report for the purposes of the baseline analysis contained in Appendix B. This is consistent with the 2014 White Paper which states at paragraph 2.21: "Based on the 2013 UK RWI and other supporting information, the current estimated volume of all the waste and materials listed at paragraph 2.17 is around 650,000 cubic metres. This volume would fill just over half of Wembley stadium (57%)". However, not all of the waste that comprises the 2013 UK Radioactive Waste and Materials Inventory will be disposed of in a GDF. Section 10.5 has therefore been revised to provide a breakdown of the inventory for disposal based on Geological Disposal: The 2013 Derived Inventory (RWM 2015).	Appendix B (Section 10.5)
NDA12	2	In addition to the general comment on baseline information on radioactive waste we would note that the statement relating to inadequate capacity at the Low Level Waste Repository is inaccurate, and given its limited relevance to the appraisal of the	Agreed. This statement has been removed from Appendix B.	Appendix B (Section 10.4)

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
		NPS could be removed.		
NDA13	2	Given the timescales involved in implementing geological disposal, much of the baseline data presented relates primarily to the short-term timeframe and does not extend to the proposed medium- and long-term phases. The challenges in establishing a long-term baseline, and the inherent challenges associated with a generic assessment of a long-term programme, could be explored more fully in the AoS Report. It is important that the appraisal itself and the methodology and guide questions recognise this uncertainty.	Comment noted. The difficulty in establishing long-term baseline trends is recognised in the AoS Scoping Report. At Section 3.5 it states: "In some instances, data concerning predicted future trends does not cover the expected period of a GDF. Notwithstanding, the appraisal contained in the AoS Report will consider effects over the long term, informed by existing and new information on future trends as well as professional judgement". Challenges encountered during the appraisal of the draft NPS will be recorded in the AoS Report and in accordance with the requirements of the SEA Directive. No change to the Scoping Report is considered necessary.	Section 3.5
NDA14	2	As a result of the NPS being non-site specific, it would be beneficial to clearly explain in the AoS Report that the questions presented and upon which the appraisal will have been based, can only be addressed at the national and non-site specific level. Some of the detailed data within Appendix B could unintentionally give the impression that the appraisal will be conducted with a high degree of certainty regarding impacts and benefits.	Agreed. Section 4.2 of the AoS Scoping Report (concerning the geographic scope of the appraisal) has been revised to include specific reference to the fact that the appraisal will not be site-specific.	Section 1.1, Section 4.2

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
NDA15	2	Given that the NPS is not intended to be site-specific, the baseline information presented in Appendix B covers the whole of England, Wales and Scotland. While the information is generally comprehensive, given the generic nature of the NPS, in some areas the information may be more detailed than is necessary to inform the appraisal. We would therefore suggest that in undertaking the AoS, further consideration is given to how the baseline information will actually inform the appraisal and that this explanation is then captured in the AoS Report itself. This may also provide an opportunity to simplify the information presented and thus help with the accessibility of the appraisal and facilitate its clear presentation in the AoS Report.	Comment noted but not agreed with. Reflecting the geographic scope of the NPS but also the potential for trans-boundary effects, the baseline information in Appendix B is presented at the UK and national (England, Scotland and Wales) level. The baseline information is considered to be proportionate to the nature and geographic scope of the appraisal and it is unclear from this response which elements are considered to be too detailed. No change.	Appendix B
NDA16	2	The AoS Report could more clearly draw out the relationship between the AoS and the Environmental Impact Assessment and HRA that will need to be undertaken in relation to any deep boreholes or a GDF at the project level. This should reassure readers that the uncertainties inherent in the AoS for a non-site specific NPS will be resolved in many instances by project specific Environmental Impact Assessment and HRA.	Agreed. Reference to Environmental Impact Assessment and HRA at the project level has been provided in Section 2.2 of the AoS Scoping Report and as part of wider commentary relating to consenting process. It is also fully expected that reference will be made, where appropriate, to requirements for Environmental Impact Assessment and HRA as part of the appraisal of the draft NPS.	Section 2.2
NDA17	2	Given that the ambit of the NPS is geological disposal within England, further consideration could be given to the level of information required to describe the Welsh and Scottish environment. While Scotland and Wales border England, it is not	Comment noted but not agreed with. As stated in Section 3.1 of the AoS Scoping Report, baseline information and relevant plans and programmes have been considered for England, Wales and	Section 3.1

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
		obvious that the level of baseline information in the AoS Scoping Report is necessary to assess a generic NPS in England that provides for deep boreholes and a GDF.	Scotland. The geographical scope of the context and baseline has been arrived at through consideration of the fact that, although the NPS specifically concerns GDF (and deep borehole) projects in England only, there is the potential for cross-boundary effects in Scotland and Wales given their common borders with, and geographical proximity to, England. Given then potential for cross-boundary effects, it is considered wholly appropriate and necessary to include within the AoS Scoping Report baseline information for Scotland and Wales. No change.	
NDA18	2	Further consideration could be given to the level of baseline information required for the appraisal with respect to Scottish radioactive waste management plans and programmes, given that Scottish Higher Activity Waste policy is for near surface management, and geological disposal is therefore not being pursued in Scotland.	Comment noted but not agreed with. As noted above, the geographical scope of the context and baseline has been arrived at through consideration of the fact that, although the NPS specifically concerns GDF (and deep borehole) projects in England only, there is the potential for cross-boundary effects in Scotland given its common border with, and geographical proximity to, England. Given then potential for transboundary effects, it is considered wholly appropriate and necessary to include within the AoS Scoping Report baseline	Appendix B (Section 10.2, Section 10.3)

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
			information for Scotland. No change to the Scoping Report is considered necessary.	
NDA19	2	The recent Welsh Government Higher Activity Waste Policy and the supporting consultation should be recognised in the AoS Report.	Agreed. Reference to Welsh Government Policy on the Management and Disposal of Higher Activity Radioactive Waste (2015) has been included in Appendix B (Section 10.2 and Section 10.5).	Appendix B (Section 10.2, Section 10.5)
NDA20	3	In a number of areas there is potential to clarify the flow through from relevant policies to the selection of objectives and the expression of the objectives themselves. In particular, further consideration could be given to improving the clarity with which radioactive waste management and radiological protection objectives are reflected in the high level objectives and guide questions. It could also be clarified how the benefits of geological disposal, as an enabler for the decommissioning and clean-up of nuclear facilities, can be taken account of in the appraisal.	Comment noted. Table 3.2 highlights how the key environmental protection and socio-economic objectives from the review of plans and programmes contained in Appendix B have been reflected in the AoS objectives. No change to the Scoping Report is considered necessary.	Table 3.2 (Section 3.2)
NDA21	3	The AoS Report needs to provide context with respect to the expected timescales for implementation of geological disposal. The appraisal itself would be clearer and more straightforward if the timescales used were linked to activities associated with GDF implementation rather than to time periods. Short term could be defined as site selection and characterisation (including deep boreholes), medium term could be defined as GDF construction	Agreed. Table 4.2 of the AoS Scoping Report defines the timescales for the appraisal where short term includes site identification, boreholes and initial construction of GDFs, medium term includes GDF operation and long term includes closure and monitoring. The reference to short, medium and long term is in compliance with the SEA Directive	Table 4.2 (Section 4.2)

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
		and operation and long term could be defined as closure and post closure monitoring.	Annex I (f). This has been revised to reflect the timeframe outlined in Section 4 'Making it Happen' of the 2014 White Paper.	
NDA22	3	Certain appraisal questions have been phrased in terms of whether the NPS would protect and/or enhance a particular attribute, but this approach is not applied consistently throughout. We would recommend re-phrasing the assessment guide questions in Appendix A in a more consistent manner to avoid the possible risk of unfairly prejudicing the scoring.	Comment noted but not agreed with. The guide questions identified in the AoS Scoping Report are intended to guide the appraisal process only and their wording broadly reflects the baseline analysis and review of plans and programmes contained in Appendix B. The phrasing also reflects legislative requirements where appropriate. It is not considered that the wording of the guide questions would lead to unfair scoring. No change to the Scoping Report is considered necessary.	Table 4.3 (Section 4.3)
NDA23	3	The relevance of the proposed guidance on significance to a national scale appraisal could be reviewed. In a number of areas, the proposed guidance may be more relevant to site-specific development, rather than a national scale appraisal of an NPS and reasonable alternatives.	Comment noted but not agreed with. The illustrative guidance on significance contained in Appendix A is intended to guide the appraisal process only. No change to the Scoping Report is considered necessary.	Appendix A, Appendix B.
NDA24	3	Certain guide questions could also more explicitly address the inherent sustainability benefits of geological disposal and its role as an enabler for the decommissioning and clean-up of nuclear	Comment noted but not agreed with. The illustrative guidance on significance contained in Appendix A is intended to guide the appraisal process only. The	Appendix A, Appendix B.

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
		sites.	AoS will appraise the likely significant effects of the draft NPS rather than the inherent benefits of the GDF itself. No change to the Scoping Report is considered necessary.	
NDA25	3	The proposed numerical scoring criteria relating to the creation of employment would benefit from being explicit as to whether they relate to total or direct employment, and whether they relate to employment at local, regional or national scales.	Agreed. The illustrative guidance has been revised to refer to direct FTE jobs. The guidance as currently worded refers to benefits at the local community scale and therefore additional clarification is not deemed to be necessary.	Appendix A, Appendix B
NDA26	3	The illustrative guidance for Assessment of Waste and Resource Use appears to use the same description - 'option would ensure the safe handling of hazardous wastes' - for both positive (+) and very positive (++) scores. Different descriptors would appear to be appropriate, since they relate to different scores.	Agreed. The illustrative guidance "Option would ensure the safe handling of hazardous wastes" has been removed against the positive effect threshold in order to differentiate between the scoring.	Appendix A, Appendix B
NDA27	3	Within Table 3.2, several of the entries in the column headed Objectives for the Biodiversity and Cultural Heritage and Landscape / Townscape themes read as statements rather than as objectives.	Agreed. Table 3.2 has been amended to include a summary of key objectives identified from the review of plans and programmes for biodiversity and nature conservation.	Table 3.2 (Section 3.2)
Nuclear Legacy Advisory Forum				
NLAF1	1	We are content that all the main issues have been addressed and do not feel that any issue should be removed. Certain issues	Comment noted.	N/A.

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		e.g. around energy and carbon, link across a number of topic areas and it is important that the inter-dependencies and cross-cutting nature of such issues is properly addressed in the appraisal.	No change required.	
NLAF1	2	Yes.	Comment noted. No change required.	N/A.
NLAF1	3	Yes.	Comment noted. No change required.	N/A.
Public Health England				
PHE1	1	In terms of human health, given the long-timescales of the potential radiological impact of waste (possibly in excess of 10,000 years), explicit consideration of the post operational phase of the facility and the impact on future population should be made. For example, Table Non-Technical Summary 1 states that "Consideration will need to be given to the potential effects on public and worker health and safety arising from the construction and operation of the GDF" but no mention is made of the possible effects on the public once institutional control has ceased.	Comment noted. Table 4.2 sets out the timescales for the AoS of the draft NPS. This clarifies that the AoS will consider the long-term effects of the draft NPS which is defined as being 120 years and beyond and as including closure and monitoring. No change to the Scoping Report is considered necessary.	Table 4.2 (Section 4.2)
PHE2	3	Additionally, the proposed guide question in Table 4.3 states "Will the Geological Disposal NPS protect and/or enhance the health, safety and well-being of local communities and specific groups	Agreed. The following additional guide question has been included in Table 4.3: "Will the Geological Disposal Infrastructure NPS	Table 4.3 (Section 4.3),

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		within those communities?" It is important that the health of the wider community is also considered.	protect and/or enhance the health, safety and well-being of wider communities (i.e. those communities that are not host to a GDF or deep boreholes)?"	Appendix A, Appendix B, Non-Technical Summary
Scottish Environment Protection Agency				
SEPA1	General	We note that the policy statement relates solely to England and as such our interest in the Appraisal of Sustainability is limited to ensuring adequate consideration of any significant effects of a cross-border nature which may be identified during the appraisal. We have reviewed the documents submitted and are generally content that the scope and level of detail proposed in the scoping report for the assessment will adequately address these issues.	Comment noted. No change required.	N/A
SEPA2	1	We are content with the proposed scope of the appraisal.	Comment noted. No change required.	N/A
SEPA3	1	We are generally content with the issues set out in the Appraisal of Sustainability Scoping Report but would highlight the following: The links between traffic and transport, air quality, and human health could be more consistently made i.e. Topic 7 Air Quality (p.66) makes the link between air quality, health and transport, but this is not continued through into Topic 3 or 11. For example Topic 3 Human Health (p.62) identifies respiratory illness as an	Comment noted. It is agreed that there are linkages between the topics to be considered as part of the AoS of the draft NPS and Appendix B has sought to identify these where appropriate, although this is not intended to be exhaustive. Whilst the baseline information and AoS objectives are presented by topic, the appraisal of the draft	Appendix B, Section 4.2

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
		issue resulting from air pollution, but does not make the link with traffic / transport systems. Similarly, Topic 11 Traffic and Transport (p.66-67) makes no link to health or air quality.	NPS will consider linkages between the topics as appropriate (for example, the potential impacts of vehicle movements on human heath). This has been noted in Section 4.2 of the Final Scoping Report.	
SEPA4	1	Given the need to transport waste to the GDFs it would be beneficial for these links to be consistently drawn out in the assessment. To give an example, the assessment may consider whether transport requirements will result in potential congestion of the network and / or increased use of certain routes which could result in effects on air quality and subsequently the health (physical and mental) of the communities through which these routes pass.	Comment noted. The AoS of the draft NPS will identify the linkages between, for example, vehicle movements, emissions to air and health impacts. No change to the Scoping Report is considered necessary.	N/A
SEPA5	2	The Scottish context set out on pages 65-66 would also benefit from consideration of the environmental determinants of health. The following references will help to provide additional background information in this respect: • Public Health etc. (Scotland) Act 2008 - legislation for public health enabling Scottish Ministers, health boards and local authorities to better protect public health in Scotland. Defines “protecting public health” to mean protecting the community or any part of it from (i) infectious diseases, (ii) contamination, or (iii) other such hazards which constitute a danger to human health.	Comment noted. The Public Health etc. (Scotland) Act 2008 and guidance has been included in Appendix B. The SIMD and ScotPHO Online Profiles Tool are not considered to be plans and programmes in the context of the SEA Directive and have therefore not been included in Appendix B. Further, the information provided by these sources is unlikely to be appropriate in the context of a national level assessment.	Appendix B (Section 3.2)

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
		• Guidance to accompany the Statutory Nuisance Provisions of the Public health etc. (Scotland) Act 2008 – to be read in conjunction with the Environmental Protection Act 1990 and Part 9 of the Public health etc. (Scotland) Act 2008. • The Scottish Index of Multiple Deprivation (SIMD) incorporates several different aspects of deprivation and combines them into a single index in order to provide a relative ranking for 6,505 data zones which cover the whole of Scotland. The SIMD can be used as a means to identify "vulnerable populations" within the plan area. • ScotPHO Online Profiles Tool – contains profiles for all Scottish local authority areas using a range of measures including a health and wellbeing profile which highlights the variation in health between areas and helps identify priorities for health improvement.		
SEPA6	2	The effects noted in bullet point four under the title Land Use and Soils (page 90) also apply to Scottish soils.	Comment noted. Reference to Scotland (and Wales) has been included as per this response.	Appendix B (Section 4.4)
SEPA7	2	Page 114 refers only to the Scotland River Basin District; it should be noted that there are two River Basin Districts in Scotland - the other being the Solway Tweed River Basin District (which is referred to on page 119). The latter will be of particular relevance for cross-border considerations in the assessment. The second plans for both districts will be published in December	Comment noted. Reference has been made to the Solway Tweed River Basin District in Appendix B as per this response.	Appendix B (Section 5.2)

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
		2015. For further information see: www.sepa.org.uk/environment/water/river-basin-management-planning/.		
SEPA8	2	The Water Environment (Controlled Activities) (Scotland) Regulations 2011 and amendments (see www.sepa.org.uk/regulations/water/ for details) are the current regulations which should be referred to in Table 5.3.	Comment noted. The Water Environment (Controlled Activities) (Scotland) Regulations 2011 and amendments have been referred to in Table 5.3.	Table 5.3 (Appendix B), Appendix A
SEPA9	2	We would highlight the forthcoming Flood Risk Management Strategies for Scotland as a potentially useful source of contextual information. The public consultation on these strategies has recently been completed with the final documents due to be published in December 2015. Further information is available from our website: www.sepa.org.uk/environment/water/flooding/flood-risk-management/.	Comment noted. Reference to the Flood Risk Management Strategies for Scotland has been included in Appendix B.	Appendix B (Section 6.2)
SEPA10	2	With regard to Safeguarding Scotland's Resources (bottom of page 191) the consultation paper Making Things Last (Circular Economy) is currently out for consultation until 30 October 2015 – https://consult.scotland.gov.uk/zero-waste-delivery/making-things-last	Comment noted. Reference to Making Things Last (Circular Economy) has been included in Appendix B.	Appendix B (Section 10.2)
SEPA11	2	For information, PAN 63 (referred to at the bottom of page 193) has been replaced by the Scottish Government's on-line Planning and Waste Management Advice (July 2015) which is	Comment noted. Reference to PAN 63 has been deleted and replaced by reference to Scottish Government's on-line Planning and Waste	Appendix B (Section 10.2)

Ref	Consultation Question	Consultation Response	Commentary / Action Taken	Relevant Location in Final Scoping Report
		available from: http://www.gov.scot/Resource/0048/00481407.pdf.	Management Advice (July 2015).	
SEPA12	3	We are generally content with the proposed objectives; we suggest some minor additions to the proposed guide questions below: Human health (page 76) It would be useful to include an additional question in relation to already vulnerable communities e.g. Will the Geological Disposal NPS disproportionately affect communities already identified as vulnerable / at risk – including those who are already exposed to high natural background levels of radiation?	Agreed. The following guide question has been included under AoS Objective 3: "Will the Geological Disposal Infrastructure NPS disproportionately affect communities already identified as vulnerable/at risk?"	Table 4.3 (Section 4.3), Appendix A, Appendix B, Non-Technical Summary
SEPA13	3	Air (page 77) Suggest adding reference to light as a potential source of nuisance.	Comment noted. It is not considered appropriate for reference to light to be included under AoS Objective 7 (which relates to air quality). However, the following additional guide question has been included under AoS Objective 13 (Landscape and Townscape): "Will the Geological Disposal Infrastructure NPS help to minimise light pollution from construction and operational activities on residential amenity and on sensitive locations and receptors?"	Table 4.3 (Section 4.3), Appendix A, Appendix B, Non-Technical Summary
SEPA14	3	Noise (page 78) These questions could be expanded to include specific reference	Comment noted. It is considered that the existing guide question "Will the Geological Disposal	Table 4.3 (Section

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		to transport related noise / vibration of construction and / or operational activities.	Infrastructure NPS help to minimise noise and vibration effects from construction and operational activities on residential amenity and effects on sensitive locations and receptors?" will enable noise/vibration from construction and operational activities as well as vehicle movements to be considered as part of the AoS of the draft NPS. No change to the Scoping Report is considered necessary.	4.3), Appendix A, Appendix B, Non-Technical Summary
Scottish Natural Heritage				
SNH1	General	Agrees that there is potential for significant effects on Scotland's natural heritage interests and welcomes that this has been scoped this into the assessment.	Comment noted. No change required.	N/A
SNH2	General	We are content with the scope and level of detail proposed for the environmental report.	Comment noted. No change required.	N/A
SNH1	3	In terms of recording scores in the proposed appraisal matrix, Table 4.4, it is noted that where scores are both positive and negative, that this is recorded as no overall effect. It does not necessarily follow that a positive effect will always cancel out a negative effect and it would be useful if there was some narrative in the Commentary column to clarify the nature of the impacts. This will also be the case in the Cumulative Assessment Matrix.	Agreed. The wording of Table 4.4 is unclear and has been revised. Where both positive and negatives effects are identified during the appraisal of the draft NPS, this will be indicated through the award of two scores (i.e. mixed positive and negative effects). Neutral effects will only be identified where no effects are anticipated.	Table 4.4 (Section 4.4)

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EDF Energy				
EDF1	1	EDF Energy believes that the topic areas listed in Section 4.2, "Proposed Scope of the Appraisal" are appropriate. We would expect that the Appraisal of Sustainability will be carried out alongside the Habitats Regulations Assessment of the National Policy Statement, and will share information fully to expedite the delivery of a high quality National Policy Statement.	Comment noted. The Habitats Regulations Assessment will be undertaken alongside the AoS and the findings used to inform the appraisal, particularly in respect of effects of the draft NPS on biodiversity. No change.	N/A.
EDF2	2	EDF Energy believes that the AoS Scoping Report is thorough and has set out sufficient information to establish the context for the appraisal.	Comment noted. No change required.	N/A.
EDF3	3	EDF Energy agrees that the AoS objectives are suitably broad and we believe that the guide questions are relevant. We have no further guide questions or objectives to add.	Comment noted. No change required.	N/A.
United Utilities				
UU1	General	UU have no comment to make at this stage, but wish to be included in further consultations.	Comment noted. No change required.	N/A.

[1] As part of the preparation of this AoS Report, the experiences of Sweden and Finland in the application of the SEA Directive to proposed geological disposal programmes have been reviewed. However, given the location, setting and differences in assessment, reference could not be made to either.

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