Department for
Business, Energy
& Industrial Strategy

National Policy Statement for Geological Disposal Infrastructure

A framework document for planning decisions on nationally significant infrastructure

Presented to Parliament pursuant to Section 9(8) of the Planning Act 2008

July 2019

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1. Introduction

1.1 Introduction

1.1.1 The UK has accumulated radioactive waste from a range of activities including nuclear power generation, medicine, research and defence-related nuclear programmes. Most of the waste can be disposed of safely in facilities on the surface but a suitable facility is still needed for the remaining higher activity radioactive waste, some of which will remain hazardous for hundreds of thousands of years.

1.1.2 Geological disposal involves placing waste deep underground and containing it within multiple barriers, to ensure that the hazardous materials are isolated from the surface environment and contained for the time required for the radioactivity associated with them to naturally reduce. This ensures that no harmful quantities of radioactivity ever reach the surface environment.

1.1.3 Geological disposal is internationally recognised as the safest and most secure means of permanently managing our higher activity waste, with countries such as Finland, Sweden, France, Canada and the USA also pursuing this option.

1.2 Purpose

1.2.1 This National Policy Statement (NPS) sets out the need for nationally significant infrastructure projects (NSIPs) related to the geological disposal of higher activity radioactive[1] waste in England and the government's approach to deliver them. It also provides planning guidance for developers of NSIPs on geological disposal infrastructure. Geological disposal infrastructure includes both:

- any deep geological facility for disposing of the waste - geological disposal facilities. See further paragraph 1.3.1 for what constitutes a geological disposal facility;
- the deep borehole investigations necessary to characterise the geology at a particular site to enable assessment of the sites' suitability for a geological disposal facility. See further paragraph 1.3.2 for what constitutes associated boreholes.

1.2.2 This NPS will be used as the primary basis for the examination by the Examining Authority, and for decisions by the Secretary of State, in considering development consent applications for geological disposal infrastructure that falls within the definition of a nationally significant infrastructure project as set out in section 14(1)(q) and section 30A of the Planning Act 2008 ('the Planning Act'). Development in respect of any other type of geological disposal infrastructure, other than as defined in section 30A of the Planning Act, will be treated as a nationally significant infrastructure project only if a direction under section 35 of the Planning Act has been issued in respect of that development[2].

[1] Includes the following categories of radioactive waste: high level waste, intermediate level waste, a small fraction of low level waste with a concentration of specific radionuclides sufficient to prevent its disposal as low level waste; further information on the waste to be managed is given in section **2.3**.
[2] See section 35, Planning Act 2008 – Directions in relation to projects of national significance.

1.2.3 In making decisions on such applications, the Secretary of State must have regard to any local impact report submitted by a local authority in accordance with the Planning Act, any appropriate marine policy documents as determined in accordance with section 59 of the Marine and Coastal Access Act 2009, any matters prescribed that are relevant to the application, and any other matters which the Secretary of State considers to be both important and relevant to any decision.

1.2.4 Pursuant to section 104 of the Planning Act, the Secretary of State must decide an application for geological disposal infrastructure in accordance with this NPS, unless to do so would:

- lead to the UK being in breach of its international obligations;
- be unlawful;
- lead to the Secretary of State being in breach of any duty imposed by or under any legislation;
- result in adverse impacts of the development outweighing its benefits;
- be contrary to legislation about how the decisions are to be taken.

1.2.5 In this NPS the terms 'effects', 'impacts' or 'benefits' should respectively be understood to mean significant effects, impacts or benefits. In this context, environmental, social and economic benefits and adverse impacts should be considered at national, regional and local levels.

1.2.6 In this NPS, the terms 'applicant' and 'developer' are used interchangeably and should be construed as being the same person.

1.2.7 This NPS sets out the need for geological disposal infrastructure and highlights the generic impacts of the proposed development that the applicant will have to consider when making an application for development consent[3]. It also provides a clear framework for those making development consent applications for geological disposal infrastructure; in particular setting out what should be included in their assessment of the potential impacts of a particular development and how these should be mitigated (see chapter 5).

1.2.8 The policy and guidance on generic impacts in chapter 5 of this NPS may be helpful to local planning authorities in preparing their local impact reports[4], which they will be invited to prepare under section 60 of the Planning Act.

1.2.9 In England, this NPS may also be a material consideration in making decisions on applications for development that fall within local authority planning regimes (for example under the Town and Country Planning Act 1990). Whether, and to what extent, this NPS is a material consideration, will be judged on a case by case basis. This NPS is not a site-specific document. That is, it 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 (see section 1.4 on territorial extent) that must be addressed in any development consent application in relation to such infrastructure.

1.2.10 The process of identifying a site for geological disposal infrastructure is separate from the process of considering development consent applications (see section **2.4** for

[3] The planning process for development consent is set out on the Planning Inspectorate website which can be accessed online at: https://infrastructure.planninginspectorate.gov.uk/application-process/the-process/
[4] Information on local impact reports can be found on the Planning Inspectorate website.

more detail on this). Any application for development consent is expected to be made following a separate process to identify a site that may be suitable for a geological disposal facility. The process to identify a site is expected to be led by the developer. Similarly, the process by which the relevant independent statutory regulators assess the nuclear safety, security and environmental protection of the facility is also distinct from the application for development consent.

1.2.11 Published documents (including legislation) referenced in this NPS may be revised or replaced from time to time. Where such a document is revised or a successor document has been published, references in this NPS should be read as being references to that document as revised or to that successor document.

1.2.12 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[5].

1.2.13 This NPS and the accompanying documents refer to relevant EU Directives, the status of which within the UK will change once the UK has left the EU. References to a Directive in chapters 4 ('Assessment Principles') and 5 ('Impacts') of this NPS should, following the UK's departure from the EU, be read as references to the domestic legislation that implemented the Directive (including that domestic legislation as it is revised or replaced from time to time). References to a Directive elsewhere should be read in the context in which they appear.

1.2.14 The Environment Agency regulates the disposal of radioactive waste in England under the Environmental Permitting (England and Wales) Regulations 2016. This legislation introduced staged regulation of a geological disposal facility, and an environmental permit will need to be granted by the Environment Agency before a developer can start borehole drilling, construction operations or emplacement of radioactive waste. Guidance[6] was issued in 2009 on the Environment Agency's requirements for authorisation of geological disposal facilities for solid radioactive waste. The Environment Agency will be responsible for regulating the environmental aspects of the development (e.g. during the operation of the facility, managing the impacts of any discharges from the facility and the required monitoring, and overseeing that the standards to protect people and the environment are met for the surrender of the environmental permit once the facility is closed).

1.2.15 A geological disposal facility will be subject to the requirements of the Nuclear Installations Act 1965 and will require a licence from the Office for Nuclear Regulation before construction and operation of the facility. The Office for Nuclear Regulation will regulate the safety and security of the licensed site.

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

[6] Environment Agency, Northern Ireland Environment Agency (NIEA) 'Geological Disposal Facilities on Land for Solid Radioactive Wastes: Guidance on Requirements for Authorisation' February 2009: www.gov.uk/government/uploads/system/uploads/attachment_data/file/296504/geho0209bpjm-e-e.pdf

1.3 Infrastructure covered by this NPS

1.3.1 Nationally significant infrastructure in relation to the geological disposal of radioactive waste is defined in section 30A of the Planning Act 2008 ('the Planning Act'). Applications for development consent relating to geological disposal infrastructure will be made in accordance with the Planning Act. Geological disposal infrastructure, as defined in the Planning Act, comprises a facility in England (or within England's territorial waters[7] up to the seaward limits of the territorial sea) that meets the following conditions:

- the main purpose of the facility is expected to be the final disposal of radioactive waste;
- 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[8].

1.3.2 As well as the facility itself, deep boreholes are also included within the Planning Act as geological disposal infrastructure. This is defined as the construction of one or more boreholes, and the carrying out of any associated excavation, construction or building work, where:

- the borehole or boreholes will be constructed, and any associated excavation, construction or building work will be carried out, in England or waters adjacent to England up to the seaward limit of the territorial sea; and
- the 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 borehole is to obtain information, data or samples to determine the suitability of a site for the construction or use of a radioactive waste geological disposal facility[9].

1.3.3 Therefore, this NPS covers both types of infrastructure projects – the deep boreholes necessary to determine the suitability of a site for a geological disposal facility, and the construction of a radioactive waste geological disposal facility itself. Applications for development consent for these projects may also include 'associated development' within the meaning of the Planning Act[10]. 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.

[7] Territorial waters refers to any area of water over which a state has jurisdiction. In the UK this is up to twelve nautical miles (22km).
[8] See section 30A (1) and (2), Planning Act 2008.
[9] See section 30A (4) and (5), Planning Act 2008.
[10] www.gov.uk/government/uploads/system/uploads/attachment_data/file/192681/Planning_Act_2008_-_Guidance_on_associated_development_applications_for_major_infrastructure_projects.pdf

1.4 Territorial Extent

1.4.1 This NPS provides 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 in England, and beneath the seabed in waters adjacent to England up to the seaward limits of the territorial sea.

1.4.2 While the NPS applies in England only, the Appraisal of Sustainability and Habitats Regulations Assessment which informed this NPS (see sections 1.7 and1.8) considered the potential socio-economic and environmental impacts of nationally significant infrastructure related to geological disposal in Wales and Scotland, given their common borders with England.

1.4.3 Radioactive waste management is a devolved policy issue. 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. This NPS only applies to proposals for development in England and the Secretary of State will not decide applications for development in other parts of the UK.

1.5 Consideration of deep borehole investigations

1.5.1 Under the Planning Act, geological disposal infrastructure includes both radioactive waste geological disposal facilities and deep boreholes (for which see section 1.3 of this NPS). Some of the environmental, social and economic impacts would be similar between these two activities, but they vary considerably in scale. The generic impacts of a geological disposal facility are likely to far exceed the generic impacts of deep borehole investigations as the scale of the infrastructure, both in terms of physical size and the period of time during which it will be operational, are considerably greater for the facility itself.

1.5.2 It is anticipated that multiple deep borehole investigations will be needed over the lifetime of the site characterisation programme[11]. Identifying the need for, and location of, deep boreholes during site characterisation is likely to be an iterative process; with the need and location of any deep boreholes required later in the process informed by the data obtained from earlier deep borehole investigations. For this reason, several separate applications for development consent for deep boreholes are likely to be made rather than one application for the total number of deep boreholes.

1.5.3 An applicant may choose to make a development consent application for deep boreholes that covers:

- a single deep borehole;
- one or more tranches of a specified number of deep boreholes;
- both one or more deep boreholes and a geological disposal facility.

[11] When a potential site is identified, a programme of focussed geological investigations will take place (site characterisation); this will include a number of deep borehole investigations and will aim to characterise the subsurface to such a degree that the developer is confident a safety case can be made for a geological disposal facility.

Any of the above options for taking forward a development consent application for deep borehole investigations (being deep boreholes as defined in Section 30A of the Planning Act) would in principle be acceptable provided that an environmental assessment can be, and is, carried out by the applicant. Where the applicant is making a development consent application for both one or more deep boreholes and a geological disposal facility, the applicant will need to have previously developed one or more other deep boreholes, such that the developer has appropriate geological information to provide confidence that a geological disposal facility could be sited within the proposed area.

1.5.4 There is likely to be significant variation in the timing, phasing and number of deep boreholes required at different potential sites, as this will be highly dependent on the geological conditions at the respective sites. A full site characterisation programme is anticipated to take up to 10 to 15 years to complete (as an estimate of the time, based on a number of deep boreholes in a number of tranches and associated analytical assessments).

1.5.5 For the purposes of this NPS, the construction and operational phase of deep borehole investigations refers to the drilling, on-going monitoring and remediation operations at any given site as well as associated excavation, construction or building work. Where the 'operational lifetime' is referred to in this NPS, this includes the construction (including any pre-construction works) and use of a deep borehole, as well as including any remediation work or required deep borehole closure/decommissioning.

1.5.6 Due to the anticipated iterative nature of the placement of deep boreholes, the applicant may need to make several applications for development consent for deep boreholes. To avoid having to make a separate application for every deep borehole that is constructed, applicants may (as noted above) submit one application for multiple deep boreholes (even if located many kilometres away from each other). Using this method, a tranche of deep boreholes can be considered under a single application for development consent. The applicant should be able to identify the approximate geographic location of all the deep boreholes in that application to such a degree to enable the applicant to provide a specific and relevant Environmental Statement[12]and (if necessary) Habitat Regulations Assessment (see section 4.3).

1.5.7 For all types of development consent application relating to deep boreholes, applicants should seek advice from the statutory and other relevant consultees on their expectations for the nature and scope of information to be presented in an Environmental Statement for the proposed deep borehole locations.

1.5.8 Where an application for development consent is for more than one deep borehole, the application should acknowledge that the details of the programme of deep borehole investigations may need to evolve over a number of years. The applicant should discuss the parameters of the programme with the Planning Inspectorate in advance of making an application for development consent. The applicant must set out in its application those clearly defined parameters within which that programme is expected to evolve. The Environmental Statement must take account of the likely evolution of the programme of deep boreholes within these parameters and reflect the likely significant effects of such flexibility within the proposed development.

[12] As defined in 14(2) of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. An **Environmental Statement** is a publicly available document, which sets out the developer's own assessment of the likely environmental effects of the developer's proposed development. It is prepared by the developer and submitted with the planning application.

Further guidance on this approach is given in Advice Note No. 9 published by the Planning Inspectorate[13].

1.5.9 In considering any applications for development consent for deep boreholes, the Examining Authority and Secretary of State will take into account the effects of the development that is the subject of the application; they will not be required to consider the effects of possible future deep boreholes or the development of a geological disposal facility at the relevant site. In addition, it should be noted that there is no formal requirement for an applicant to have all the information that is to be provided by earlier deep borehole investigations in order to be granted development consent for further deep boreholes that are part of the same site characterisation programme. However, such information may be relevant for demonstrating the need for those further deep boreholes.

1.6 Consideration of geological disposal facilities

1.6.1 Although the generic environmental and socio-economic impacts identified in chapter 5 of this NPS apply to both a geological disposal facility and deep boreholes, a broader assessment will be required for the geological disposal facility applications. The applicant should include information about the generic environmental and socio-economic impacts referred to in chapter 5 of this NPS of the proposed development covering the pre-construction, construction, operation and closure and post-closure phases of the facility.

1.6.2 Construction of the underground disposal vaults and tunnels for the disposal of the waste will continue during the operational period of the facility, i.e. in parallel with waste emplacement operations. This operational period is estimated to be approximately 150 years[14], though the facility itself will remain (and be safe and secure) over much longer geological timescales. Development consent applications must therefore consider the long term impacts of the facility, including explaining how the needs of future generations have been considered. As part of any application for development consent, the applicant should be clear about the estimated operational lifetime and potential variances in this estimated timescale.

1.6.3 For the purposes of this NPS, ‘closure’ refers to the process of permanently closing the facility. Key activities that are expected to take place during the closure phase are: backfilling and sealing of disposal areas (unless already completed during the operational period); backfilling and sealing of access tunnels, shafts and boreholes; removal and decommissioning of surface facilities (that is buildings and installations), and site restoration; and potentially institutional control[15]. The period after the closure, once the facility has been sealed and the waste successfully disposed of, is referred to as post-closure. Where the ‘operational lifetime’ is referred to in this NPS, this refers to the construction (including pre-construction works) and operation of the facility, up to and including closure. It is recognised that the Environment Agency will consider certain environmental impacts during the post-closure phase as part of the environmental safety case submitted by the applicant under the environmental permitting regime. It is recognised that the applicant’s environmental assessment of

[13] http://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2013/05/Advice-note-9.-Rochdale-envelope-web.pdf
[14] ‘Implications of the 2013 ‘Derived Inventory on the generic Disposal System Safety Case’ report, available online at: www.nda.gov.uk/publication/implications-of-2013-derived-inventory-on-gdssc/.
[15] Institutional control means an administrative and/or legal control that helps minimise the potential for human exposure to contamination and/or protect the integrity of remediation.

the post-closure phase for the purposes of its application for development consent will be limited. The Environmental Statement supporting an application should explain those limitations. For this reason, environmental impacts arising during the post-closure period are not considered in chapter 5 of this NPS.

1.6.4 It is expected that a geological disposal facility will comprise of both surface and underground facilities. For the purposes of this NPS, 'surface facilities' refers to any part of the facility that is built at or above the surface of the ground that is required for the lifetime of the facility. In any application, assessment of the generic impacts should include the cumulative impacts of surface and underground facilities.

1.6.5 It is possible that the main elements of the surface facilities and underground facilities could be located a significant distance apart depending on the characteristics of the potential site. When locating the surface facilities an applicant should give good reasons for the location of the site, which should be chosen to limit the total adverse impacts of the development as far as reasonably practicable within safety and reasonable financial constraints.

1.6.6 Due to the long term nature of the development, the applicant should take into consideration the need to retain the opportunity to maintain or upgrade infrastructure surrounding the facility over the lifetime of the proposed development. For example, the surface facilities must be resilient to the variability in climate over the operational lifetime of the facility and be able to operate efficiently as transport systems evolve over the lifetime of the proposed development.

1.6.7 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 network and transfer them to the underground disposal facilities.

1.6.8 A geological disposal facility will include both surface facilities and sub-surface infrastructure, and it is likely that the sub-surface infrastructure could extend some distance laterally from the surface facilities. As a result, the Examining Authority and Secretary of State should consider whether any restrictions should be established in respect of land use and development in the area of land above the sub-surface infrastructure. In this context the applicant may include in its application, in accordance with section 120 of the Planning Act, a request for compulsory acquisition powers to create new rights over land such as restrictive covenants to control land use. Any such request would need to be explained and justified by the applicant, including during pre-application consultation.

1.7 Sustainability considerations

1.7.1 Section 5(3) of the Planning Act requires that an Appraisal of Sustainability is carried out of the policy set out in the NPS. An Appraisal of Sustainability has been published alongside this NPS and has been carried out in such a way that it also satisfies the requirements of the Strategic Environmental Assessment (SEA) Directive[16].

1.7.2 The Appraisal of Sustainability was undertaken alongside the development of this NPS and has informed the preparation of this NPS; the conclusions of this appraisal and how these have influenced the NPS are given in the separate Appraisal of

[16] European Parliament and Council Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment. The Strategic Environmental Assessment Directive has been transposed in England by the UK Strategic Environmental Assessment Regulations, SI 2004/1633.

Sustainability Report ('Appraisal of Sustainability of the National Policy Statement for Geological Disposal Infrastructure').

1.7.3 The Appraisal of Sustainability appraised the likely sustainability effects of implementing the NPS in delivering the government's policy of geological disposal for higher activity radioactive waste, with a particular focus on:

- the proposed NPS objectives set out in section 1.12 of the draft NPS;
- the proposed assessment principles and guidance on impacts and general siting considerations contained within chapters 4 and 5 of the draft NPS;
- the reasonable alternatives to the draft NPS.

1.7.4 The assessments are largely qualitative in nature, due to a lack of quantitative data specific to project-level developments; quantitative data will be available at a later stage once a site has been identified. Expertise from the Department for Business, Energy and Industrial Strategy's (BEIS) appointed contractor for the Appraisal of Sustainability Report and reference to relevant legislation and guidance was used to predict effects where data were limited.

1.8 Habitats considerations

1.8.1 The NPS has also been assessed under the Habitats and Wild Birds Directives[17] and the implementing regulations (the Conservation of Habitats and Species Regulations 2017) (the 'Habitats Regulations').

1.8.2 This NPS sets out UK government policy rather than specifying locations for new infrastructure, so the Habitats Regulations Assessment has been undertaken at a strategic level. The Habitats Regulations Assessment Report ('National Policy Statement for Geological Disposal Infrastructure Habitats Regulations Assessment') has been published alongside this NPS.

1.8.3 The Habitats Regulations Assessment considered the likely significant effects on European designated nature conservation sites (Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Ramsar Sites) of delivering the government's policy of implementing geological disposal for higher activity radioactive waste through the NPS. The approach adopted in this assessment covered:

- screening;
- appropriate assessment;
- assessment of alternatives; and
- assessment of imperative reasons of overriding public interest (IROPI) and identification of compensatory measures.

1.8.4 The conclusions of this assessment are given in the separate Habitats Regulations Assessment Report.

[17] The European Council Directive (92/43/EEC) on the Conservation of Natural Habitats and of Wild Flora and Fauna (the Habitats Directive) and Directive 2009/147/EC (Codified version of Directive 79/409/EEC) on the conservation of wild birds.

1.9 Equality Assessment

1.9.1 The NPS has been informed by an Equality Assessment, which has been published alongside the NPS.

1.9.2 Under the Equality Act 2010, public bodies have a statutory duty when exercising their functions to consider the need:

- to eliminate unlawful discrimination, harassment, victimisation and any other conduct prohibited by the 2010 Act;
- to advance equality of opportunity between people who share a protected characteristic and people who do not share it; and
- to foster good relations between people who share a protected characteristic and people who do not share it[18].

1.10 Relationship with other NPSs

1.10.1 This is a stand-alone NPS and does not form part of the suite of energy NPSs under EN-1. It is also separate from the NPS on hazardous waste infrastructure (hazardous waste facilities being distinct from the facilities for the geological disposal of higher activity radioactive waste).

1.11 Period of validity and review

1.11.1 The NPS will remain in place in its entirety unless withdrawn or suspended in whole or in part by the Secretary of State. It will be reviewed by the Secretary of State, in accordance with the requirements of the Planning Act, when the Secretary of State considers it appropriate to do so.

1.12 Summary of NPS Objectives

1.12.1 In summary, this NPS 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 radioactive waste;
- to provide guidance to nationally significant infrastructure developers on the relevant infrastructure, generic impacts and general siting considerations that may need to be taken into account when planning for the development of geological disposal infrastructure;

[18] For the purposes of the statutory duty to have due regard to “advancing equality of opportunity” and “fostering good relations”, the protected characteristics are: age; disability; gender reassignment; pregnancy and maternity; race; religion or belief; sex; and sexual orientation.

- 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.

2. Government Policy on Management of Higher Activity Radioactive Waste

2.1 Government policy background

2.1.1. 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 that:

- achieved long term protection of people and the environment;
- was open and transparent and inspired public confidence;
- was based on sound science;
- ensured the effective use of public monies.

Between 2003 and 2006, a wide range of options for how to deal with the UK's higher activity radioactive waste was considered by the independent Committee on Radioactive Waste Management (CoRWM), from indefinite storage on or below the surface through to propelling the waste into space. In July 2006, CoRWM recommended[19] that geological disposal, coupled with safe and secure interim storage, was the best available approach for the long term management of the UK's higher activity radioactive waste (based on their consideration of legacy waste). CoRWM issued a statement reiterating its commitment to geological disposal in 2013[20] and has continued to restate this in its most recent work programme[21].

2.1.2. In October 2006, the UK government and devolved administrations published a response to CoRWM accepting its recommendations[22]. In May 2007, the 'Meeting The Energy Challenge[23]' white paper was published and this and the subsequent consultation[24] introduced the preliminary government view that the private sector should be encouraged to invest in new nuclear power stations to reduce carbon emissions and improve the security of energy supply. The 2007 White Paper and the subsequent consultation both examined the ethical considerations surrounding the creation of new nuclear waste. The government also proposed that new nuclear radioactive waste could be accommodated with legacy radioactive waste in a

[19] 'Managing our Radioactive Waste Safely' – the Committee on Radioactive Waste Management's Recommendations to government, July 2006, available online at: www.gov.uk/government/publications/managing-our-radioactive-waste-safely-corwm-doc-700

[20] CoRWM Ninth Annual Report: www.gov.uk/government/publications/corwm-ninth-annual-report-2012-to-2013

[21] CoRWM: Programme of Work 2018 to 2021: www.gov.uk/government/publications/committee-on-radioactive-waste-management-corwm-programme-of-work-2018-to-2021

[22] Response to the Report and Recommendations from the Committee on Radioactive Waste Management, Defra, 2006, available online at: http://130.88.20.21/uknuclear/pdfs/corwm-govresponse.pdf

[23] Meeting the Energy Challenge: A White Paper on Energy, DTI, May 2007, www.gov.uk/government/publications/meeting-the-energy-challenge-a-white-paper-on-energy

[24] The Future of Nuclear Power: The role of nuclear power in a low carbon UK economy: https://webarchive.nationalarchives.gov.uk/20081105160613/http://www.berr.gov.uk/whatwedo/energy/whitepaper/consultations/nuclearpower2007/page39554.html

geological disposal facility, citing scientific and international experience to justify this view.

2.1.3. After public consultation, two subsequent White Papers were published in 2008. The first White Paper[25] confirmed the government's policy to allow industry to build new nuclear power stations. The White Paper set out the government's position on the ethical considerations. It acknowledged the implications of generating new nuclear waste, but also took into account the important contribution that nuclear energy could make to the reduction of carbon emissions and the security of energy supply. Taking all of this into account, the government concluded that the balance of ethical considerations did not rule out the option of new nuclear power stations. This White Paper also confirmed that geological disposal is the government's approach to the disposal of higher activity radioactive waste generated by new nuclear power stations, and that before giving development consent for new nuclear power stations the government needs 'to be satisfied that effective arrangements exist or will exist to manage and dispose of the waste they will produce' . The second White Paper[26] published in 2008 confirmed the government's commitment to geological disposal for legacy and new waste and outlined the programme of work related to geological disposal.

2.1.4. In recommending geological disposal as the best available approach for the long term management of higher activity radioactive waste, CoRWM also recommended a commitment to a programme of research and development, and that developments in alternative management options should be actively pursued. Other long term management options could emerge as practical alternatives to geological disposal for some waste in future.

2.1.5. In line with this, the Nuclear Decommissioning Authority (NDA)[27] and its subsidiary Radioactive Waste Management Ltd (RWM)[28] continue to review appropriate solutions, including learning from and engaging with overseas programmes. At the moment, no credible alternatives have emerged that would accommodate all of the categories of waste in the inventory for disposal and it is clear that a geological disposal facility will remain necessary for some types of higher activity radioactive waste.

2.1.6. In December 2018 the UK government published an updated framework for the long-term management of higher activity waste, *Implementing Geological Disposal – Working with Communities*[29] This document replaces the 2014 White Paper (Implementing Geological Disposal – A framework for the long term management of higher activity radioactive waste[30]) in England. It provides updates on the actions set out in the 2014 White Paper, including the policy on how the government will work

[25] Nuclear White Paper 2008: 'Meeting the Energy Challenge', Cm 7296,DBERR, 2008, pg.99, available online at: www.gov.uk/government/publications/meeting-the-energy-challenge-a-white-paper-on-nuclear-power
[26] 'Managing Radioactive Waste Safely: A Framework for Implementing Geological Disposal', Defra, 2008, available online at: www.gov.uk/government/publications/managing-radioactive-waste-safely-a-framework-for-implementing-geological-disposal
[27] NDA Radioactive waste management strategy: www.gov.uk/government/consultations/nda-radioactive-waste-management-strategy
[28] Geological Disposal: Review of Alternative Radioactive Waste Management Options: https://rwm.nda.gov.uk/publication/geological-disposal-review-of-alternative-radioactive-waste-management-options/
[29] Implementing Geological Disposal – Working with Communities: www.gov.uk/government/publications/implementing-geological-disposal-working-with-communities-long-term-management-of-higher-activity-radioactive-waste
[30] Implementing Geological Disposal: www.gov.uk/government/publications/implementing-geological-disposal

with communities to identify a suitable location for a GDF. The policy on working with communities set out in the 2018 document applies to the government's designated delivery body for its programme of geological disposal, RWM; however, this NPS is standalone and applies to any developer wishing to apply for development consent for geological disposal infrastructure.

2.1.7. The UK government remains committed to the policy of geological disposal of higher activity radioactive waste for the reasons set out in CoRWM's 'Recommendations to government', subsequent UK government policy documents on radioactive waste management and Chapter 3 of this NPS.

2.1.8. In July 2011, following public consultation, the UK government published the National Policy Statement for Nuclear Power Generation (EN-6)[31] which provided guidance for decision-makers on the application of government policy in determining development consent for new nuclear power stations. It concluded that the 2006 CoRWM recommendations (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) were also appropriate for the wastes from new nuclear power stations. It stated that the government considers, based on scientific consensus and international experience, that despite some differences in characteristics, waste and spent fuel from new nuclear power stations would not raise such different technical issues compared with nuclear waste from legacy programmes as to require a different technical solution. In their eighth annual report[32], CoRWM stated that "wastes from new reactors should simply be managed in due course. CoRWMs scrutiny and advice role relates to the whole of the inventory and it does not need a separate position on new build working".

2.1.9. The UK government remains satisfied that effective arrangements will exist to manage and dispose of the waste from new nuclear power stations.

2.2 What is geological disposal?

2.2.1 Geological disposal involves isolating radioactive waste deep inside a suitable rock volume to ensure that no harmful quantities of radioactivity ever reach the surface environment.

2.2.2 This is achieved through the use of multiple barriers[33] that work together to provide protection over hundreds of thousands of years. It is not a case of simply depositing waste underground. The multiple barriers that provide safety for geological disposal are a combination of the following:

- 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;

[31] National Policy Statement for Nuclear Power Generation (EN-6) Volume II of II – Annex B, DECC, July 2011, available online at: www.gov.uk/government/publications/national-policy-statements-for-energy-infrastructure
[32] Committee on Radioactive Waste Management Eighth Annual Report 2011-12. (paragraph 7.4) Published June 2012, available online at: www.gov.uk/government/publications/corwm-8th-annual-report-2011-to-2012
[33] Radioactive Waste Management, The Multi-Barrier Approach, Science file, October 2017, available online at: www.gov.uk/government/uploads/system/uploads/attachment_data/file/654537/3._The_multi-barrier_approach_Proof_6__1_.pdf

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

Geology

2.2.3 Geology plays a part in the multi-barrier system of isolating and containing the radioactive waste from people and the surface environment. The radioactive waste remains radioactive for a long time, in some cases up to hundreds of thousands of years; this radioactivity reduces over time by radioactive decay. This means that geological disposal isolates and contains the radioactive waste over the time where the radioactivity will naturally decay and ensures that no harmful quantities of radioactivity ever reach the surface environment.

2.2.4 The depth at which the geological disposal facility will be placed also plays an important part in isolating and containing the radioactive waste from people and the surface environment. A geological disposal facility will be located between 200 and 1000 metres below the surface, where the waste will be protected in the event of earthquakes, tsunamis and long term environmental changes such as future glaciation.

2.2.5 There are different suitable geologies for geological disposal of radioactive waste, identified by international research, including:

- Higher strength rock;
- Lower strength sedimentary rock; and
- Evaporites

Geological disposal facilities in other countries are progressing in various geological formations.

2.2.6 The design of a geological disposal facility would depend on the geology and its characteristics (such as rock type and volume).

Retrievability

2.2.7 The UK government and regulators agree that the purpose of a geological disposal facility is to dispose of waste, not to store it.

2.2.8 During the operational stage of a geological disposal facility (when waste is being accepted), waste that has been placed into a geological disposal facility could be retrieved if there was a compelling reason to do so. Current estimates show that a geological disposal facility could be open for construction and waste emplacement for around 150 years[34], to accommodate the current volume of legacy waste. Retrieving emplaced waste would tend to become more difficult with time, particularly after the end of its operational stage (that is, once a geological disposal facility has been closed permanently).

[34] These forecasts of the construction and waste emplacement periods are provided by Radioactive Waste Management, and are derived considering the UK radioactive waste inventory data

2.2.9 Permanently closing a geological disposal facility at the earliest possible opportunity once operations have ceased provides for greater safety, greater security, and minimises the burden on future generations.

Number of geological disposal facilities

2.2.10 The UK government favours an approach where one geological disposal facility will provide the capacity needed for the disposal of the inventory described in paragraph 2.3.15. The development of one site for geological disposal of the entire inventory would allow for the sharing of surface facilities, access tunnels, construction support and security provisions, leading to major cost savings, and lower environmental impacts[35].

2.2.11 However, it may not be practical to dispose of all the waste in one geological disposal facility, and so it cannot be ruled out that more than one such facility will be required. For this reason, the Secretary of State should not refuse to grant development consent for a geological disposal facility only because the proposed facility would have insufficient capacity for the entire inventory.

2.2.12 In an application for development consent for a geological disposal facility, the developer should provide a statement setting out the nature and amount of waste expected to be disposed of at the relevant site.

2.3 Waste to be managed

2.3.1. Higher activity radioactive waste comprises a number of categories of radioactive waste - high level waste, intermediate level waste, and some types of low-level waste.

2.3.2. Higher activity radioactive waste is produced:

- as a result of the generation of electricity in nuclear power stations;
- from the associated production and reprocessing of the nuclear fuel;
- from the use of radioactive materials in industry, medicine and research;
- from defence-related nuclear programmes.

2.3.3. As a pioneer of nuclear technology, the UK has accumulated a legacy of higher activity radioactive waste and material. This is being stored on an interim basis at nuclear licensed sites across the UK. More will be produced as existing facilities reach the end of their lifetime and are decommissioned and cleaned up, and through the operation and decommissioning of new nuclear power stations.

2.3.4. In addition to existing wastes, there are some radioactive materials that are not currently classified as waste, but would, if it were decided at some point that they had no further use, need to be managed as wastes through geological disposal. These include spent fuel (including spent fuel from new nuclear power stations), plutonium and uranium.

[35] The development of a geological disposal facility requires significant initial supporting infrastructure that will be required regardless of the size of a geological disposal facility. The inventory for disposal is therefore expected to have a limited impact on the scale of these facilities. Because this infrastructure does not scale linearly with the inventory the financial costs and environmental impact of developing these facilities would be duplicated should multiple geological disposal facilities be required.

2.3.5. The wastes that will be disposed of in a geological disposal facility are referred to in this document as the 'inventory for disposal'. The types and amounts of waste that make up this inventory for disposal are important because the layout and design of any disposal facility will need to be tailored to them. Therefore, it will be the responsibility of the developer to state clearly in the application for development consent the types and amount of waste expected to be disposed of in the facility.

2.3.6. The different types of radioactive waste and nuclear material that will make up the inventory for disposal are described below:

High level waste

2.3.7. High level waste is defined in the UK as waste in which the temperature may rise significantly as a result of its radioactivity, such that this factor has to be taken into account in designing storage or disposal facilities. High level waste arises in the UK initially as a liquid from the reprocessing of spent nuclear fuel. High level waste is being converted into solid glass form using a treatment process called 'vitrification'. Current plans are that this waste will be stored for a number of decades, to allow a significant proportion of the radioactivity to reduce through a natural decay process, and for the waste to become cooler, so that it will be easier to transport and dispose of in a geological disposal facility.

Intermediate level waste

2.3.8. Intermediate level waste is defined in the UK as waste with radioactivity levels exceeding the upper boundaries for low level wastes, but which does not require heat to be taken into account in the design of storage or disposal facilities. Intermediate level waste arises mainly from the reprocessing of spent fuel and from general operations and maintenance at nuclear sites. It can include solid metal items such as fuel cladding and reactor components, and solidified sludges from the treatment of radioactive liquid effluents. Typically, intermediate level waste is treated in solid form and packaged in purpose-designed containers, manufactured from stainless steel, iron or concrete.

Low level waste

2.3.9. Low level waste is the lowest activity category of radioactive waste. Low level waste currently being generated in the UK consists largely of paper, plastics and scrap metal items that have been used in hospitals, research establishments and the nuclear industry. Although low level waste makes up more than 99% of the UK's radioactive waste legacy by volume, it contains less than 0.1% of the total radioactivity[36]. Most operational low level waste in the UK is sent to the national Low Level Waste Repository in West Cumbria where it is encapsulated in cement and packaged in large steel containers, which are then placed in an engineered vault a few metres below the surface. A small fraction of the total volume of low level waste cannot be disposed of in this way, due principally to the concentration of specific radionuclides, and is intended to be disposed of in a geological disposal facility.

[36] Nuclear Decommissioning Authority, 'Radioactive Wastes in the UK: A Summary of the 2016 Inventory', page 14, available online at: https://ukinventory.nda.gov.uk/wp-content/uploads/sites/18/2017/03/High-Level-Summary-UK-Radwaste-Inventory-2016.pdf

Other nuclear material

2.3.10. Another potential aspect of the inventory for disposal is 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.

Spent fuel

2.3.11. Spent fuel currently arises in the reactors of the operational nuclear power stations in the UK. It consists mostly of uranium, although it also includes plutonium and fission products. There are three main types of reactor in the UK and spent fuel from each is handled differently. Spent fuel from Magnox reactors is currently reprocessed, with the reprocessing of spent Magnox fuel due to be completed in 2020. Reprocessing separates spent nuclear fuel into its constituent elements. Any remaining fuel will be stored pending decisions about its future disposal. Reprocessing of spent fuel from Advance Gas-cooled Reactors (AGRs) was completed in November 2018. The UK ceased reprocessing as existing reprocessing contracts have now been fulfilled and because current reprocessing facilities have reached the end of their design life and would require significant investment to upgrade in order to continue reprocessing spent fuel. This enables greater focus on the decommissioning and clean-up programme at the Sellafield site. The remaining and future waste arising from AGRs will be stored pending decisions about its future disposal. Spent fuel from Pressurised Water Reactors (PWRs) is stored pending decisions about its future disposal. Spent fuel also arises from the UK defence programme and will arise from new nuclear power stations.

2.3.12. There is also some spent fuel from research reactors previously operating at sites such as Harwell, Sellafield and Dounreay that is stored pending decisions about its future disposal.

Plutonium

2.3.13. In 2011 the UK government set out its preferred policy for the long term management of civil separated plutonium – that it should be reused in the form of mixed oxide fuel (MOX). At that time the government believed that there was sufficient information to set out a direction, but not to implement a MOX programme. Since then the government has been working closely with the NDA to develop, assess and ultimately to implement approaches to put the inventory of separated civil plutonium beyond reach. As a proportion of the inventory cannot be re-used, both re-use as new nuclear fuel and immobilisation are being considered. Policy can be settled only when the government is confident that a solution can be implemented safely and securely and that it is affordable, deliverable, and offers value for money.

Uranium

2.3.14. Uranium arises typically from either fuel manufacture, enrichment processes or from reprocessing spent fuel after irradiation in a nuclear reactor. Uranium is currently stored securely, in different forms, on fuel manufacture, enrichment and reprocessing sites.

Inventory for disposal

2.3.15. 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 geological disposal facility are:

- high level waste arising from the reprocessing of spent nuclear fuel at Sellafield;
- intermediate level waste arising from existing nuclear licensed sites, defence, medical, industrial, research and educational facilities;
- the small proportion of low level waste 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 new build programme up to a defined amount (see paragraph 2.3.17 below);
- plutonium stocks - plutonium not re-used in new fuel manufacture (yet to be declared as waste);
- uranium stocks – including that arising from enrichment and fuel fabrication activities (yet to be declared waste);
- irradiated fuel and nuclear materials (yet to be declared waste) from the UK defence programme.

2.3.16. As component parts of the inventory for disposal in a geological disposal facility, it is not expected that the categories of waste and material listed above will change significantly. The volumes of these wastes and materials are regularly assessed, revised and made publicly available via the UK Radioactive Waste Inventory[37]. The Inventory for Geological Disposal[38] details what waste from the UK Radioactive Waste Inventory is destined for geological disposal. Volumes are subject to change due to a number of factors, including improvements to the estimates of waste that will arise from planned operations and decommissioning programmes. Government policy also requires users of radioactive materials to minimise the radioactive waste requiring disposal, and this is regulated by the regulators.

2.3.17. When an application is made for development consent for a geological disposal facility there will remain some uncertainty on the volumes of these wastes (e.g. the precise volume of waste from new nuclear power stations will not be known). The 2014 White Paper set out that the industry at the time was proposing about a 16GW electrical new nuclear pipeline. The spent fuel and intermediate level waste arising from new nuclear development up to this level constitutes the defined amount at present, though the pipeline could increase or decrease as new nuclear projects progress. The inventory for disposal will be updated on a regular basis to reflect new nuclear waste.

[37] The UK's Radioactive Waste Inventory, available online at: https://ukinventory.nda.gov.uk

[38] See the Radioactive Waste Management website for the most up to date information. The Inventory for Geological Disposal 2016 is available online at: www.gov.uk/government/publications/2016-inventory-for-geological-disposal . This was published in December 2018 and contains the most complete information on radioactivity and volumes of different categories of waste including waste related to new build and the impact on the GDF designs. This information is published every 3 years, so the next update of this information would be expected in 2021, based on RWM processing the information provided in the 2019 UK Radioactive Waste Inventory, expected later this year.

2.4 Strategy for implementation

Policy Framework for Implementation

2.4.1 The Implementing Geological Disposal – Working with Communities[39] policy document sets out the UK government's framework for managing higher activity radioactive waste in the long term through geological disposal, which will be implemented alongside on-going interim storage and supporting research. This policy document:

- outlines the policy background and the activities undertaken by the UK government since the 2014 White Paper[40];
- outlines the relationship between the planning process and regulatory regimes; and
- sets out the Working with Communities process, including community investment and the siting process that will be undertaken by RWM, who have been tasked by government to develop the geological disposal facility.

2.4.2 As noted in paragraph 2.1.6, the Working with Communities process applies only to RWM; in contrast, this NPS is standalone and applies to any developer wishing to apply for development consent for geological disposal infrastructure.

2.4.3 This NPS does not seek to identify areas or sites where a geological disposal facility could or should be located, nor where deep borehole investigations could or should take place. Neither does the NPS describe a process for identifying a suitable location for a geological disposal facility, which is a separate process from any application for development consent.

2.4.4 Implementing geological disposal, including identification and characterisation of potential sites, is the responsibility of the developer. The length and scale of technical investigations will be highly dependent on the characteristics of the area being assessed but will likely comprise non-intrusive and intrusive (borehole) investigations, feeding into extensive and iterative modelling of the sub-surface environment.

2.4.5 The developer will need to demonstrate in its application for development consent for deep boreholes, the suitability of potential sites for investigation. Subsequently in its application for development consent for construction of a geological disposal facility, the developer will need to demonstrate the suitability of a potential site for that geological disposal facility. These demonstrations should be in terms of the properties of the geological environment and how these properties may contribute to the safety of a geological disposal facility. The Examining Authority and the Secretary of State should also be satisfied that the applicant has demonstrated the suitability of the proposed site for investigation (that is deep boreholes), and subsequently for construction of a geological disposal facility with reference to the proposed inventory for disposal at that site.

[39] Implementing Geological Disposal – Working with Communities, 2018: www.gov.uk/government/publications/implementing-geological-disposal-working-with-communities-long-term-management-of-higher-activity-radioactive-waste

[40] Implementing Geological Disposal: A Framework for the long-term management of higher activity radioactive waste, 2014: www.gov.uk/government/publications/implementing-geological-disposal

Regulatory Framework

2.4.6 In addition to the application for development consent, the Environment Agency will consider whether a geological disposal facility meets standards for environmental protection through the environmental permitting regime. The Office for Nuclear Regulation will consider nuclear safety, conventional health and safety, and security of a geological disposal facility through nuclear site licensing.

Relationship between the regulatory framework and the planning regime

2.4.7 Permitting and licensing are separate regulatory processes which will apply to geological disposal infrastructure. The regulators will operate a 'staged regulation' approach to the geological disposal infrastructure. To avoid unnecessary duplication and/or delay and to ensure that planning and regulatory expertise are focussed on the most appropriate areas, when considering a development consent application, the Examining Authority and the Secretary of State should act on the basis that:

- the relevant licensing and permitting regimes will be properly applied and enforced;
- they should not duplicate the consideration of matters that are within the remit of the Environment Agency and the Office for Nuclear Regulation (see paragraph 2.4.8 below); and
- they should not delay a decision as to whether to grant consent until completion of the licensing or permitting processes (see paragraphs 2.4.10 and 2.4.11 below).

2.4.8 Annex A sets out the differences between the planning regime and the staged regulation under the environmental permitting and nuclear site licensing regimes, including information on what each decision-making body will be considering at each stage. Note that this table does not contain the full breadth of matters that the regulators will be consulted on within the development consent process, nor that they are responsible for regulating. The table identifies certain matters that are for consideration by the Environment Agency and the Office for Nuclear Regulation; the Examining Authority and the Secretary of State should not duplicate the consideration of these matters. Such matters include the suitability of a site to safely host a geological disposal facility.

2.4.9 Applicants should have involved the Environment Agency and the Office for Nuclear Regulation early enough during the pre-application stage so that they have had the opportunity to incorporate the relevant regulators' requirements in proposals where appropriate. However, the Secretary of State can consider and determine an application for development consent where the permitting process is still in progress, because the Secretary of State can seek and rely on advice from the Environment Agency and Office for Nuclear Regulation on whether the necessary permits are likely to be issued. Consent should not be refused on the grounds of matters within the remit of the regulators unless the Secretary of State has good reason to believe that any necessary licence or permit will not subsequently be granted.

2.4.10 If the regulatory approvals process is incomplete the Secretary of State should also seek advice from the Environment Agency and the Office for Nuclear Regulation on any relevant regulatory requirements that are likely to be imposed and the anticipated timing of these processes; the Secretary of State should liaise with the Environment Agency and the Office for Nuclear Regulation over any relevant requirements the

Secretary of State is considering attaching to a development consent. This is in order to ensure that where possible the requirements attached to a Development Consent Order are consistent with the regulatory approvals process and vice versa.

2.4.11 The information in Annex A summarises the staged regulation approach that the regulators will take to both the deep boreholes and the geological disposal facility. As the table shows, the regulatory processes extend past the development consent process and continue through operation, closure and post-closure of the facility. The table also identifies the stages of the safety case that the developer will need to provide to the regulators to ensure the safety and security of the development.

Application for deep boreholes

2.4.12 When a potential site is identified, a programme of focussed geological investigations will take place (site characterisation). This will include a number of deep borehole investigations: boreholes of greater than 150 metres depth require development consent; deep boreholes will also require an environmental permit to be granted by the Environment Agency[41].

2.4.13 Before an intrusive site-investigation programme begins the developer will submit an Initial Site Evaluation to the Environment Agency, giving largely qualitative views on the feasibility of constructing a geological disposal facility at the potential site. The Environment Agency will need to understand from the Initial Site Evaluation how intrusive site investigation work would inform any future environmental safety case for a geological disposal facility.

Application for a geological disposal facility

2.4.14 Deep borehole investigations will characterise the sub-surface to the extent that a Preliminary Environmental Safety Evaluation can be produced to support an application for an environmental permit for underground investigations and a pre-construction safety report to support an application for a nuclear site licence. Development consent will be needed for underground investigations and construction of the geological disposal facility.

2.4.15 The Preliminary Environmental Safety Evaluation will present qualitative arguments supported by limited quantitative assessment based on available site knowledge and data to demonstrate the suitability of the site to the Environment Agency (see section **4.7**). The developer will also need to demonstrate to the Office for Nuclear Regulation how it will manage both conventional and nuclear safety during excavation operations (see section **4.9**). Once a geological disposal facility is ready to take its first waste packages but before disposals commence, an appropriate environmental permit and a permission under the nuclear site licence will be needed. The operator of the geological disposal facility will need to develop its safety justification and provide evidence that the facility operations are safe and secure and that, after it has closed, people and the environment will be protected in the long term. This evidence may include information and data obtained in previous development phases, from research, development and demonstration studies, and from experience in other countries.

[41] See the Environmental Permitting (England and Wales) Regulations 2016, available online at: www.legislation.gov.uk/uksi/2016/1154/contents/made

3. The need for geological disposal infrastructure

3.1 Introduction

3.1.1 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. The development of geological disposal infrastructure is essential because it provides the best available practical means of ensuring the long term safety and security of higher activity radioactive waste.

3.1.2 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 designation of this NPS. A summary of this policy can be found in section 2.1 and references therein.

3.1.3 Both types of nationally significant infrastructure projects covered by this NPS, deep boreholes and a geological disposal facility (section 1.3 of this NPS) are required to successfully implement the government's policy on the long term management of radioactive waste. The main drivers of need for geological disposal infrastructure covered by this NPS are summarised below.

3.2 The need for a geological disposal facility

3.2.1 Significant amounts of higher activity radioactive waste already exist, as a result of a wide range of activities. They are currently being stored safely on an interim basis at licensed nuclear sites across the UK (see section 2.3). More waste will arise as existing nuclear facilities reach the end of their lifetime and are decommissioned. These categories of waste are together known as 'legacy' waste.

3.2.2 In addition, more radioactive waste will be produced through the operation and decommissioning of any new nuclear facilities. The need for new nuclear power stations is discussed in 2.1.2 and 3.2.18-21, as well as in the National Policy Statement for Nuclear Power Generation referred to in 2.1.7. This category of waste is known as 'new build' waste.

3.2.3 There is a need for a long term management solution for higher activity radioactive waste through the development of a geological disposal facility (or facilities see 2.2.10-2.2.12) for the reasons set out below:

The technical need

3.2.4 Interim storage provides a temporary, safe and secure environment for higher activity radioactive waste. It is the long term surface storage at licensed nuclear sites across the UK. It is not, however, a permanent solution.

3.2.5 Some of the higher activity radioactive waste under consideration will remain hazardous to humans and the wider biosphere for hundreds of thousands of years; new interim stores currently being built typically have a design life of one hundred years. Therefore, long term surface storage is not a viable option as stores would

have to be rebuilt and the waste packages within them repacked, many times during the hundreds of thousands of years that the waste remains hazardous. This would involve increased attendant worker dose[42] and increased safety risk.

3.2.5 Government does not consider long term surface storage to be a permanent solution because of this requirement for constant human monitoring, maintenance, rebuild and repackaging, and the constant protection from natural processes, environmental changes, and malicious attack. Higher activity radioactive waste needs to be isolated from people and the surface environment for periods of time that are very long in comparison with human lifespans but are short on geological timescales. Geological disposal can provide this long term isolation; radioactivity decays naturally over time, so radioactive waste is managed in appropriate facilities to ensure that no harmful quantities of radioactivity ever reach the surface environment.

3.2.6 Placing radioactive waste deep underground puts it far beyond people's reach, so that it is safe and secure. The rock will shield people from the radiation and, depending on the rock type, will either limit or completely prevent radioactivity from moving towards the surface. Disposal deep underground will also ensure that the waste can never be exposed at the surface even in the event of a change in sea level or future ice ages.

3.2.7 The White Paper in 2008[43] concluded the following: “The government considers that it would be technically possible and desirable to dispose of both new and legacy waste in the same geological facilities and that this should be explored through the Managing Radioactive Waste safely programme”. Since then successive versions of the inventory of radioactive waste for geological disposal have been created by NDA/RWM with support from CoRWM and radioactive waste producers. These inventories have combined information on new build and legacy radioactive waste and have been created to support discussions with potential host communities and support other enablement work for geological disposal infrastructure, including technical design work. In 2011 the National Policy Statement for Nuclear Power Generation (EN-6)[44] concluded that geological disposal was also appropriate for the wastes from new nuclear power stations. In CoRWM’s eighth annual report they refer to this “wastes from new reactors should simply be managed in due course. CoRWM’s scrutiny and advice role relates to the whole of the inventory and it does not need a separate position on new build working.” From a technical perspective the management needs of new build and legacy radioactive waste are being handled as one, as part of the work programme for geological disposal infrastructure.

3.2.8 There is currently no facility in the UK to permanently dispose of the higher activity radioactive waste inventory. Geological disposal provides a practical and technically achievable means to do so, without which the UK can only keep storing its waste. There is continual review of appropriate solutions to the disposal of higher activity radioactive waste[45, 46], including learning from and engaging with overseas

[42] The Ionising Radiations Regulations 2017 lay down the radiation dose limits for the protection of the health of workers and the general public against the dangers arising from ionising radiation.
[43] Nuclear White Paper 2008: 'Meeting the Energy Challenge', Cm 7296,DBERR, 2008, pg.99, available online at: www.gov.uk/government/publications/meeting-the-energy-challenge-a-white-paper-on-nuclear-power
[44] National Policy Statement for Nuclear Power Generation (EN-6) Volume II of II – Annex B, DECC, July 2011, available online at: www.gov.uk/government/publications/national-policy-statements-for-energy-infrastructure
[45] NDA Radioactive waste management strategy: www.gov.uk/government/consultations/nda-radioactive-waste-management-strategy
[46] Geological Disposal: Review of Alternative Radioactive Waste Management Options: https://rwm.nda.gov.uk/publication/geological-disposal-review-of-alternative-radioactive-waste-management-options/

programmes. Possible alternatives that are kept under review include the use of near surface disposal, and deep borehole disposal. At the moment, there are no credible alternatives that have emerged that both have been proven to be technically feasible for radioactive waste disposal and would accommodate all of the categories of waste in the inventory for disposal. As a result of this, in any realistic future scenario it is clear that a geological disposal facility will remain necessary.

The ethical need

3.2.9 The UK government believes there is an ethical imperative to progress with the disposal of radioactive waste.

3.2.10 As one of the generations that has benefitted from medical treatments, research, electricity and defence activities that have all produced radioactive waste, the UK government believes it is the responsibility of this generation to dispose safely of this waste.

3.2.11 It is government policy to have new nuclear as part of the energy mix to reduce carbon emissions and for security of energy supply (see 2.1.2 and 3.2.21-24). The new nuclear power station being constructed at Hinkley[47] was granted a development consent order after assessment of the application against the National Policy Statement for Nuclear Power Generation and the need established within that document. Again, as one of the generations that will benefit from the electricity generated by this power station and potential other new nuclear power stations, the government believes that we have a responsibility to provide for the safe disposal of the waste which they produce.

3.2.12 Indefinite storage would be a burden for future generations. There would be significant cost associated with the safe and secure storage of higher activity radioactive waste. In addition, for the long time periods for which waste is radioactive, there would be wider on-going risks and responsibilities associated with surface storage. We have a responsibility to address this and reduce these future burdens.

3.2.13 This view is shared by the Committee on Radioactive Waste Management (CoRWM), They produced a report in 2006 that states: “we should dispose of the wastes as soon as practicable on the grounds that we cannot know what technological needs or powers may be available to our successors. The present generation should remove the burden imposed by its actions from the future”[48].Then, in a further statement on June 2013, CoRWM reiterated its commitment to geological disposal and stated that: “The aim should be to progress to disposal as soon as practicable, consistent with developing and maintaining public and stakeholder confidence”. The CoRWM 2006 recommendation extended only to legacy waste; however, the UK government considers that the principles and reasoning underlying it apply equally to waste from new nuclear development (see paragraph 2.1.2 and 2.1.8). Following the decision that new nuclear power stations should form part of the UK’s future energy mix, there is an equivalent ethical imperative to remove the burden of dealing with the waste generated by those new nuclear power stations from future generations.

3.2.14 The Organisation for Economic Co-operation and Development Nuclear Energy Agency Radioactive Waste Management Committee has concluded that “from an

[47] Hinkley Point C (Nuclear Generating Station) Order 2013 www.legislation.gov.uk/uksi/2013/648/contents/made

[48] The 2006 Committee on Radioactive Waste Management recommendations (including the recommendation to progress disposal ‘as soon as practicable’) were based on ethical principles. The Committee on Radioactive Waste Management discuss the ethical issues surrounding radioactive waste management at length in: Managing Radioactive Waste Safely, Committee on Radioactive Waste Management, 2006, Chapter 6: ‘An ethical problem’.

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"[49].

The need to meet legal obligations

3.2.15 The Spent Fuel and Radioactive Waste Directive[50] describes a framework for the responsible and safe management of spent fuel and radioactive waste, so as not to impose excessive constraints on future generations.

3.2.16 Article 5, paragraph 1 of that Directive requires Member States to establish and implement national programmes[51] for spent fuel and radioactive waste management from waste generation through to disposal. Without a programme for the disposal of higher activity radioactive waste that it has generated or will generate, the UK would not be meeting all of the requirements under this Directive.

3.2.17 The Directive identifies at the technical level, that at this time[52], 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. It further requires EU member states to establish national programmes for the timely implementation of all steps of spent fuel and radioactive waste management from generation to disposal.

3.2.18 To the extent that these obligations under the Spent Fuel and Radioactive Waste Directive cease to be legally binding on the UK following its departure from the EU, the UK will continue to be subject to other spent fuel and radioactive waste obligations as a Contracting Party to the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (the Joint Convention).

3.2.19 The Joint Convention requires Contracting Parties to take appropriate steps to ensure that individuals, society and the environment are adequately protected against radiological and other hazards at all stages of the management of spent fuel and radioactive waste. The Joint Convention also requires the Contracting Parties to take the appropriate steps to aim to avoid imposing undue burdens on future generations.

3.2.20 The UK government considers that geological disposal of higher activity radioactive waste (both legacy waste and new build waste) will ensure that people and the environment are protected from the radiological and other hazards of that waste over the long term and that the burden of dealing with the waste does not fall on future generations, and so will assist the UK in complying with its obligations under the Joint Convention.

[49] Nuclear Energy Agency (NEA), Organisation for Economic Co-operation and Development, 'Moving Forward with Geological Disposal – A Collective Statement by the Nuclear Energy Agency Radioactive Waste Management Committee', 2008, available online at: http://bit.ly/1jzKJfw

[50] Council Directive 2011/70/Euratom of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32011L0070

[51] www.gov.uk/government/publications/the-uks-national-programme-to-the-eu-commission-on-the-responsible-and-safe-management-of-spent-fuel-and-radioactive-waste

[52] Council Directive 2011/70 Euratom, recital 23 July 2011

The need to meet energy and climate change objectives

3.2.21 Section 5(8) of the Planning Act requires that the policy set out in this NPS takes account of government policy relating to the mitigation of, and adaptation to, climate change. The way in which development of geological disposal infrastructure achieves this is set out below.

3.2.22 For the UK to meet its energy and climate change objectives, the government believes that there is a need for new electricity generation, including new nuclear power. Nuclear power generation is a low carbon, proven technology, which is anticipated to play an important role as we move to diversify and decarbonise our sources of electricity. New nuclear power stations will help to ensure a diverse mix of technology and fuel sources, which could increase the resilience of the UK's energy supply. See paragraph 2.1.2 and 2.1.7.

3.2.23 The 2008 Nuclear White Paper set out the UK government policy position that, before development consents for new nuclear power stations are granted, the government will need to be satisfied that effective arrangements exist or will exist to manage and dispose of the waste that they will produce. This continues to be government policy. In 2011, the government set out in the National Policy Statement for Nuclear Power Generation why it was satisfied that such arrangements will exist: "Geological disposal is the way in which higher activity waste will be managed in the long term." Therefore without plans in place to implement government policy on geological disposal, which ultimately includes the development of a geological disposal facility that will accept new build waste, the UK will not be able to consent new nuclear power plants and meet its energy and climate change objectives.

3.2.24 Further information on Climate Change Adaptation and climatic factors is given in sections **4.6** and **5.5** respectively.

3.3 The need for deep boreholes

3.3.1 The need for deep boreholes is driven by technical requirements. Deep boreholes form part of a wider integrated programme of site characterisation which is ultimately required for the successful development of a geological disposal facility. These boreholes provide geoscientific information to support:

- the development of site-specific designs and safety case to inform decisions on the suitability of a potential site;
- the identification of a potential site for a geological disposal facility and its detailed design, construction and safety case;
- the development and implementation of that detailed design and safety case; and
- monitoring of an eventual geological disposal facility site.

3.3.2 Deep boreholes will in all likelihood form an essential pre-cursor to any geological disposal facility development. They are defined as nationally significant infrastructure in the Planning Act and applications for development consent for such infrastructure will be examined and determined in accordance with this NPS. Without the information from deep boreholes it may be impossible to characterise a site to such a

degree that a safety case could be made for the construction of a geological disposal facility at that site, or to design a geological disposal facility that made best use of the local geology with regard to safety[53]. The 'need case' for deep boreholes set out in the NPS is for investigative purposes at sites that may or may not ultimately be sites of a geological disposal facility.

3.4 Conclusion

3.4.1 There is a technical, ethical and legal need to manage higher activity radioactive waste in the long term by disposing of this waste in a geological disposal facility. There is legacy waste, including waste from over 60 years' nuclear generation that is at present 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.

3.4.2 There is overwhelming international consensus that the best means of disposal is in a geological disposal facility; this is backed up by CoRWM's review in 2006 (and statement in 2013) and accepted in the government's response to the CoRWM recommendations. There is also a need to reduce the future potential risks associated with interim storage. Although CoRWM's views in 2006 relate to legacy waste, it has been settled government policy since the 2008 'Meeting the Energy Challenge' White Paper that geological disposal is also the best means of disposing of new build waste.

3.4.3 Other potential approaches to addressing the need for a long term management solution for higher activity radioactive waste have previously been considered, including as part of the work culminating in CoRWMs Report in 2006. However, those other potential approaches were found to be unsuitable for addressing one or more aspects of the need (for example, they were not technically feasible or were un-ethical). As stated in paragraphs 2.1.4 and 2.1.5, research into potential alternative long term waste management options continues and developments should be actively pursued. However, even if other long term management options are progressed for some categories of higher activity radioactive waste, in any realistic future scenario a geological disposal facility will remain necessary.

3.4.4 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 designation of the NPS.

3.4.5 The Secretary of State will assess applications for development consent for geological disposal infrastructure covered by this NPS on the basis that need has been demonstrated.

[53] See NDA's Geological Disposal - Summary of generic designs report, for information on generic designs of a geological disposal facility in different rock types, available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/635113/NDA_Report_no_DSSC-412-01_-_Geological_Disposal_-_Generic_Disposal_Facility_Designs.pdf

4. Assessment Principles

4.1 General principles of assessment

4.1.1. The scale of nationally significant infrastructure projects gives rise to the possibility of significant impacts on the environment, the economy and communities. It is therefore important for the applicant when assessing these impacts, and the Secretary of State when considering the application, to have a clear set of principles against which the application should be evaluated. These key principles relate to the design, environmental, health, safety and security aspects of the development. These key principles are outlined in Table 1.

4.1.2. The statutory framework for deciding applications for development consent under the Planning Act is set out in section 104 of the Planning Act and is summarised in section 1.2 of this NPS. This part of the NPS sets out certain general policies in accordance with which applications relating to geological disposal infrastructure are to be decided.

4.1.3. 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.

4.1.4. In making decisions on such applications, the Secretary of State must also have regard to any local impact report submitted by a local authority in accordance with the Planning Act, any appropriate marine policy documents as determined in accordance with section 59 of the Marine and Coastal Access Act 2009, any matters prescribed that are relevant to the application, and any other matters which the Secretary of State considers are both important and relevant to any such decision.

4.1.5. In this NPS the terms ‘effects’, ‘impacts’ or ‘benefits’ should accordingly be understood to mean significant effects, impacts or benefits (as stated in paragraph 1.2.5).

4.1.6. The policy set out in this NPS is intended to make determining applications for development consent for geological disposal infrastructure as clear and as transparent as possible. This NPS has taken account of national planning policy set out in the National Planning Policy Framework. In the event of a conflict between the National Planning Policy Framework or any other documents and this NPS, the NPS prevails for the purposes of the Secretary of State’s decision-making, given the national significance of geological disposal infrastructure.

4.1.7. The Examining Authority should only recommend, and the Secretary of State should only impose, requirements[54] in relation to development consent that are: necessary, relevant to planning, relevant to the development to be consented, enforceable,

[54] As defined in section 120 of the Planning Act 2008.

precise and reasonable in all other respects. The guidance in the National Planning Policy Framework[55] should be taken into account where requirements are proposed.

4.1.8. Obligations under section 106 of the Town and Country Planning Act 1990 should only be sought where they are necessary to make the development acceptable in planning terms, directly related to the proposed development and fairly and reasonably related in scale and kind to the development[56].

4.1.9. The key principles that should be taken into account by the developer, and against which applications are assessed, are set out in sections 4.5 - 4.11. These cover design, climate change, pollution control, nuisance, safety, health and security. The Assessment Principles to be used by the Secretary of State are set out in Table 1.

Table 1 – Assessment Principles

Section
4.5. Criteria for 'good design' for geological disposal infrastructure
4.6. Climate change adaptation
4.7. Pollution control and other regulatory regimes
4.8. Common Law Nuisance and Statutory Nuisance
4.9. Safety
4.10. Health
4.11 Security considerations

4.2 Environmental Impact Assessment

4.2.1 All proposals for projects that are subject to the Environmental Impact Assessment (EIA) Directive[57] and the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017[58], and are likely to have significant effects on the environment, must be accompanied by an Environmental Statement identifying, describing and assessing the aspects of the environment likely to be significantly affected by the project.

- The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 specifically refer to effects on population, human health, and biodiversity, with particular attention to species and habitats protected under the Habitats Directive and Wild Birds Directive, land, soil, water, air, climate, the landscape, material assets and cultural heritage, and the interaction between them.

[55] Planning Practice Guidance available online at: www.gov.uk/government/collections/planning-practice-guidance
[56] Where the words 'planning obligations' are used in this NPS they refer to 'development consent obligations' under section 106 of the Town & Country Planning Act 1990 as amended by section 174 of the Planning Act 2008. See paragraphs 203 - 206 of the National Planning Policy Framework.
[57] Council Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment.
[58] The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (SI 2017/572), available online at: www.legislation.gov.uk/uksi/2017/572/contents/made

- The description of the likely significant effects of the proposed project on the environment, should cover the direct effects, as well as, where relevant, indirect, secondary, cumulative, short, medium and long term, permanent and temporary, positive and negative effects of the project.
- A description of the measures envisaged to avoid, prevent, reduce or if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements, should also be given. The description should explain the extent to which significant adverse effects on the environment are avoided, prevented, reduced or offset, and should cover both the construction and operational phases.

(Guidance for a proposed development that is not an Environmental Impact Assessment development (i.e. that is not 'EIA development' as defined in the 2017 Regulations[59]) is given at the end of this chapter.)

4.2.2 The Environmental Statement should describe the significant environmental effects arising from the construction, operation and closure of the geological disposal infrastructure. Depending on the nature of the potential site, surface facilities may be located at a considerable distance from the main elements of the planned underground facilities. The applicant should ensure that any significant impacts of developing both the surface and underground facilities (and deep boreholes) are adequately covered in the Environmental Statements.

4.2.3 When examining a proposal, the Examining Authority should ensure that likely significant effects for all stages of a development up to and including closure have been adequately assessed and should request more information where necessary. Information requests should be proportionate and focus only on likely significant effects.

4.2.4 When considering cumulative effects, the Environmental Statement should provide information on how the effects of the applicant's proposal would combine and interact with the effects of other development (including projects for which consent has been sought and those which have been granted, as well as those already in existence). The Examining Authority may also consider other evidence before it on such effects and potential interactions. Any such information may assist the Secretary of State in reaching decisions on proposals and on mitigation/enhancement measures that may be required.

4.2.5 Pursuant to the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, applicants should ensure that the expected effects deriving from the vulnerability of the geological disposal facility development to risks of major accidents and/or disasters are considered. Where these effects fall outside the remit of the Examining Authority, they will be considered by the independent regulators. The applicant should make reference to the safety case, in which consideration is given to major accidents and/or disasters, in the Environmental Statement.

4.2.6 When considering a proposal, the Secretary of State should be satisfied that likely impacts (see chapter 5 of this NPS), including any significant indirect impacts and any proposed mitigation/enhancement measures to address these have been adequately assessed. In doing so, the Secretary of State should also examine whether the

[59] 'EIA development' is defined in regulation 3 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.

assessment distinguishes between the different stages in development (site characterisation, construction, operation and closure) and identifies any mitigation measures at each of those stages where appropriate.

4.2.7 The Secretary of State should consider how the accumulation of, and interrelationship between, effects may impact the environment, economy or community as a whole (even though such effects may be acceptable when considered individually with mitigation measures in place).

4.2.8 In some instances, it may not be possible, at the time of the application for development consent, for all aspects of the proposal to have been settled in precise detail. Where this is the case, the application should explain which elements of the proposal have yet to be finalised, and the reasons for this.

4.2.9 It is an acceptable approach for an applicant to submit an application seeking development consent for its project within an area known as “limits of deviation”. This means that, should development consent be granted, the project may be constructed anywhere within those authorised limits (i.e. the maximum site area). This applies to both deep boreholes and the geological disposal facility. The applicant should explain and justify the extent of the limits. Where some details are still to be finalised the Environmental Statement should set out, to the best of the applicant’s knowledge, what the maximum extent of the proposed development may be (e.g. not only in terms of the maximum site areas, but also number of deep boreholes in the application or volume of underground excavations as may be relevant to the development consent application). The Environmental Statement should also assess the maximum reasonably foreseeable adverse effects which the proposed development could have, to ensure that the likely significant impacts (see chapter 5 of this NPS) have been properly identified and considered.

4.2.10 Should the Secretary of State decide to grant development consent for an application where details are still to be finalised, this will need to be reflected in appropriate development consent requirements. Should a developer wish to modify a proposal which has already received development consent, and the modification mean that the development will be greater than has been provided for in terms of the consent granted, then it will be necessary to apply for a change to the relevant Development Consent Order. The application to change the consent may need to be accompanied by further information to supplement the original Environmental Statement, or a further Environmental Statement.

4.2.11 If the proposed development is determined not to be an Environmental Impact Assessment development, neither an Environmental Impact Assessment nor an Environmental Statement will be required. The applicant should instead provide information proportionate to the scale of the project on the likely significant environmental, social and economic effects. References to an Environmental Statement in this NPS should be taken as including a statement which provides this information, even if the proposed development is not an Environmental Impact Assessment development. Note that other detailed environmental assessments, including a Habitats Regulation Assessment, may be required regardless of the planning status of the development.

4.3 Habitats Regulations Assessment

4.3.1. Prior to granting a Development Consent Order, the Secretary of State must, under the Habitats Regulations[60], consider whether it is possible that the project is likely to have a significant effect on a (protected conservation) habitat site[61], or any site to which the same protection[62] is applied as a matter of policy, either alone or in combination with other plans or projects[63]. Applicants should also refer to section **5.4** of this NPS on Biodiversity and Nature Conservation (including Flora and Fauna) and to section **5.2** on air quality. The applicant should seek the advice of Natural England and, where appropriate for cross-boundary impacts, Natural Resources Wales and Scottish Natural Heritage to ensure that impacts on habitat sites in Wales and Scotland are adequately considered.

4.3.2. Where a proposed development is likely to have significant effects on a habitat site, an appropriate assessment under the Habitats Regulations will be required. Applicants are required to provide sufficient information with their applications for development consent to enable the Secretary of State to determine whether this is the case.

4.3.3. If such an assessment is required, the applicant must provide sufficient information as may reasonably be required for the Secretary of State to carry out the appropriate assessment. This information should include details of any measures that are proposed to minimise or avoid any likely significant effects on a habitat site.

4.3.4. If it is impossible to rule out that a proposed development might have an adverse effect on the integrity of a habitat site, the Secretary of State may still grant development consent where all of the following conditions are satisfied:

- there are no alternative solutions to the issue which the proposed development is designed to address.
- there are imperative reasons of overriding public interest for the development.
- adequate timely compensatory measures will be put in place to ensure the overall coherence of the network of protected sites is maintained.

4.3.5. Where the site concerned hosts a priority natural habitat or a priority species[64], the second condition (i.e. imperative reasons of overriding public interest) can be satisfied only where the reasons relate to human health, public safety or beneficial consequences of primary importance to the environment, or are reasons which the Secretary of State[, having due regard to the opinion of the European Commission], considers to be imperative reasons of overriding public interest.

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[60] The Conservation of Habitats and Species Regulations 2017 and the Offshore Marine Conservation (Natural Habitats, & c.) Regulations 2007 (as amended), available online at: www.legislation.gov.uk/uksi/2017/1012/pdfs/uksi_20171012_en.pdf

[61] This includes candidate Special Areas of Conservation, Sites of Community Importance, Special Areas of Conservation and Special Protection Areas, and is defined in regulation 8 of the Conservation of Habitats and Species Regulations 2017. See the Government Circular referred to in the introduction above for further information on the requirements of the Habitats Regulations.

[62] See paragraph 176 of the National Planning Policy Framework.

[63] Further guidance on the requirements of the Habitats Regulations can be found in 'Government Circular: Biodiversity and Geological Conservation – Statutory Obligations and their impact within the Planning System (ODPM 06/2005, Defra 01/2005)' and 'Guidance document on Article 6(4) of Habitats Directive 92/43/EEC'.

[64] As defined in regulation 3 of the Conservation of Habitats and Species Regulations 2017

4.4 Alternatives

4.4.1. The supporting Appraisal of Sustainability report, referred to in section 1.7 of this NPS, provides an overview of the strategic alternatives to meeting the general need for geological disposal. Potential alternatives to geological disposal are also considered in chapter 3 of this NPS, and it is noted that, at the moment, there are no credible alternatives that have emerged that would accommodate all of the categories of waste in the inventory for disposal. As a result of this, in any realistic future scenario it is clear that a geological disposal facility will remain necessary. These strategic alternatives do not need to be assessed by the Examining Authority when examining a proposed development or the Secretary of State when taking a decision.

4.4.2. This NPS does not make any specific proposals for individual developments. It does not consider specific sites, designs, layouts, construction programmes or operational processes for surface or underground facilities (including deep boreholes). Such specific developments will be for applicants to determine and will need to be examined by the Examining Authority and considered by the Secretary of State in accordance with this NPS and by the relevant regulators under their respective regulatory regimes.

4.4.3. The supporting Appraisal of Sustainability concluded that there are no reasonable alternatives at a strategic level to meeting the need for geological disposal. However, there will be consideration of site-specific level alternatives for individual projects once potential sites have been identified to help determine the most appropriate site for development. The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (regulation 14(2)(d)) require that the Environmental Statement (see section 4.2) includes a description of the reasonable alternatives studied by the applicant. The Environmental Statement should, where relevant, include an outline of the likely evolution of the current state of the environment without implementation of the project (baseline scenario).

4.5 Criteria for ‘good design’ for geological disposal infrastructure

4.5.1 Section 10(3)(b) of the Planning Act requires the Secretary of State to have regard to the desirability of achieving good design in designating and reviewing an NPS.

4.5.2 Applicants should include design as an integral consideration from the outset of a proposal. A good design should meet the principal objectives of the project by eliminating or substantially mitigating the significant impacts, by improving operational conditions and simultaneously minimising adverse impacts. Visual appearance should be a factor in considering the design of new infrastructure, as well as functionality, fitness for purpose, sustainability and cost. Applying ‘good design’ to geological disposal infrastructure projects should produce sustainable infrastructure that is sensitive to place, efficient in the use of natural resources and energy used in their construction and matched by an appearance that demonstrates good aesthetics as far as possible. It should also mitigate any existing adverse impacts wherever possible, for example, in relation to safety or the environment. A good design will also be one that sustains the improvements to operational efficiency for as many years as practicable, taking into account capital cost, economics and environmental impacts.

4.5.3 It is acknowledged, however, that given the nature of geological disposal infrastructure, particularly deep boreholes, it may not be possible for it to contribute to the enhancement of the landscape character of the area.

4.5.4 Project design will be an important and relevant consideration in decision making. Given the importance which the Planning Act places on good design and sustainability[65], the Secretary of State needs to be satisfied that geological disposal infrastructure development adheres to the principles of sustainable development[66]. In addition to observing regulatory and other constraints, the design should be as attractive, durable and adaptable (including taking account of natural hazards such as flooding[67]) as it can be.

4.5.5 The applicant should therefore take into account, as far as possible, both functionality (including fitness for purpose and sustainability) and aesthetics (including any contribution to the landscape character of the area in which it would be located). In applying these principles to applications for the development of geological disposal infrastructure, the need to ensure the safety and security of the facilities and the need to control the impacts of its operations must be given great weight given the importance of these factors to the operation of nuclear sites. The use of independent advice on the design aspects of a proposal[68] should be considered, to ensure good design principles are embedded into any application for development consent.

4.5.6 Section 5(6) of the Planning Act provides that if an NPS sets out policy in relation to a particular description of development, the statement must set out criteria to be taken into account in the design of that description of development. Whilst the applicant may only have limited choice in the physical appearance of the particular geological disposal infrastructure, there may still be opportunities for the applicant to demonstrate good design. 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 may assist in ensuring that such development contributes to the character of the area.

4.5.7 Applicants should be able to demonstrate in their application how the design process was conducted and how the proposed design evolved. Where a number of different designs were considered, applicants should set out the reasons why the favoured choice has been selected. In examining applications, the Examining Authority should take into account the ultimate purpose of the infrastructure, and ensure that the

[65] Section 10 of The Planning Act 2008.
[66] National Planning Policy Framework, 2018, can be accessed online: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/740441/National_Planning_Policy_Framework_web_accessible_version.pdf
[67] Government policy on infrastructure resilience is set out in Cabinet Office, 'Keeping the Country Running', and successor documents.
[68] Applicants may wish to use the Design Council, who can provide support for, and encourage design review of, nationally significant projects.

operational, safety and security requirements of the design comply with the aspects described above.

4.6 Climate Change Adaptation

4.6.1. Section 10(3)(a) of the Planning Act requires the Secretary of State to have regard to the desirability of mitigating, and adapting to, climate change in designating and reviewing an NPS.

4.6.2. For the UK to meet its energy and climate change objectives, the government believes that there is a need for new low carbon electricity generation, including new nuclear power. Nuclear power generation is a proven low carbon technology, which is anticipated to play an important role as we move to diversify and decarbonise our sources of electricity. New nuclear power stations will help to ensure a diverse mix of technology and fuel sources, which could increase the resilience of the UK's energy supply. Geological disposal infrastructure is a necessary enabler for new nuclear power. The 2008 White Paper on Nuclear Power[69] recognised explicitly that before development consents for new nuclear power stations are granted, the government will need to be satisfied that effective arrangements exist or will exist to manage and dispose of the waste they will produce.

4.6.3. The Secretary of State should take the effects of climate change into account when consenting geological disposal infrastructure. While the government is taking measures to mitigate the effects of climate change and reduce emissions (as stated above), the Intergovernmental Panel on Climate Change estimates that warming will continue over the operational lifetime of a geological disposal facility. Without significant reductions in emissions, the world is likely to be on course for an average temperature rise in excess of 2 °C above pre-industrial levels, and possibly as much as 5 °C for the highest emissions scenarios, by the end of this century[70].

4.6.4. Climate change is likely to mean that the UK will see, on average, hotter, drier summers and warmer, wetter winters and an increase in extreme weather events[71]. There is an increased risk of flooding, drought, heatwaves and intense rainfall events, as well as rising sea levels. Adaptation is therefore necessary to deal with the potential impacts of these changes over the operational lifetime of a geological disposal facility.

4.6.5. To support planning decisions, the government produces a set of UK Climate Projections[72] and a National Adaptation Programme[73]. In addition, the government's Adaptation Reporting Power[74] will ensure that reporting authorities (a defined list of public bodies and statutory undertakers) assess the risks to their organisation

[69] Nuclear White Paper 2008: 'Meeting the Energy Challenge', Cm 7296,DBERR, 2008, available online at: www.gov.uk/government/publications/meeting-the-energy-challenge-a-white-paper-on-nuclear-power
[70] IPCC, 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, 151 pp.
[71] UK Climate Change Risk Assessment, 2012, Defra.
[72] UK Climate Projections 2018 (UKCP18), 2009, MET Office, available online at: www.metoffice.gov.uk/research/collaboration/ukcp
[73] Climate Change: second national adaptation programme (2018 – 2023), Defra. Available online at: www.gov.uk/government/publications/climate-change-second-national-adaptation-programme-2018-to-2023
[74] Section 62 of the Climate Change Act 2008.

presented by climate change as described in the UK Climate Change Risk Assessment[75].

4.6.6. In certain circumstances, measures implemented to ensure a scheme can adapt to climate change may give rise to additional impacts; for example, as a result of protecting against flood risk, there may be consequential impacts on coastal change (see section **5.8**).

4.6.7. With regard to geological disposal infrastructure, deep boreholes may be comparatively short lived developments as compared to a geological disposal facility itself, and there may be no practical need to take account of the projected impacts of climate change, depending on the planned length of operation. A geological disposal facility itself, however, will be a long term infrastructure development, which is expected to remain operational beyond 2100, during the period of a changing climate. Consequently, applicants must consider the projected impacts of climate change when planning the location, design, build, operation, decommissioning and final closure of a geological disposal facility. The Environmental Statement (see section 4.2) should set out how the proposal will take account of the projected impacts of climate change.

4.6.8. Applicants should use the latest set of UK Climate Projections available, at the time the Environmental Statement is prepared, to ensure that they have identified the climate risks and appropriate adaptation measures. This should cover the estimated lifetime of the new infrastructure up to and including the duration of the operational lifetime (see section 1.6). Should a new set of UK Climate Projections become available, after the preparation of the Environmental Statement but before the end of the examination, the Examining Authority should consider whether they need to request further information from the applicant.

4.6.9. The applicant should use the latest available UK Climate Projections considering the scenarios that reflect a medium and a high level of greenhouse gas concentrations at the 50%, 70% and 90% probability levels to assess the impacts of climate change on the development. The applicant should also assess the potential impacts of the credible maximum scenario and demonstrate that, in principle, adaptation would be possible. Where climate projections are not available, the applicant should make appropriate use of tools for making decisions under uncertainty.

4.6.10. The applicant need not submit detailed information to the Examining Authority looking at the effects of climate change in the very long term, i.e. after operations have ceased and the geological disposal facility has been closed and sealed; in these timescales it will be difficult to predict such effects if UK Climate Projections do not extend this far into the future. The Environment Agency will assess the very long term effects in a safety case submitted to them by the applicant.

4.6.11. If any proposed adaptation measures give rise to consequential impacts, the Secretary of State should consider those impacts in relation to the application as a whole and the impacts guidance set out in chapter 5 of this NPS.

4.6.12. Any adaptation measures should again be based on the latest set of UK Climate Projections, the government's national Climate Change Risk Assessment and consultation with statutory consultees.

4.6.13. However, where adaptation measures are necessary to deal with the impact of climate change, and those measures would have an adverse effect on other aspects

[75] UK Climate Change Risk Assessment, 2017, Defra.

of the project and/or surrounding environment (e.g. coastal processes), the Secretary of State may consider whether to require the applicant to implement adaptation measures at a future point, should the need arise, rather than at the outset of the development (for example, reserving land for future extension, or increasing the height of existing infrastructure).

4.6.14. The generic impacts advice in chapter 5 of this NPS provides additional information on climate change adaptation.

4.7 Pollution Control and other Environmental Regulatory Regimes

Environmental Permitting

4.7.1 As discussed in section 2.4 the developer will need to hold an environmental permit before the start of any intrusive investigation work, such as deep borehole drilling. In addition to this, any developer will need to hold an environmental permit for the construction of any geological disposal facility, obtained before construction can start[76]. A future operator of a geological disposal facility will need to hold an environmental permit for radioactive waste disposal before any waste emplacement operations can start. The Environment Agency has published 'Guidance on Requirements for Authorisation' for geological disposal facilities (on land)[77]. The guidance sets out the requirements and environmental objectives that the developer and operator of a radioactive waste disposal facility would need to meet to be granted a permit for disposal. A permit for disposal is not required by the developer as a prerequisite for gaining development consent.

4.7.2 Issues relating to discharges or emissions from a proposed project which affect air quality, water quality, land quality and the marine environment (or which include noise and vibration) will 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. All geological disposal infrastructure covered by this NPS will be subject to the Environmental Permitting (England and Wales) Regulations 2016, which also incorporate operational waste management requirements for certain activities.

4.7.3 The planning and pollution control systems are separate but complementary. The planning system controls the development and use of land in the public interest. It plays an important role in protecting and improving the natural environment, public health and safety, and amenity. It can, for example, attach requirements to a Development Consent Order, allowing a development to proceed which would otherwise not be environmentally acceptable; it can also prevent harmful development which cannot be made acceptable even with the imposition of such requirements.

[76] Paragraph 11(6) of Part 2 of Schedule 23 of the Environmental Permitting Regulations 2016, defines the full extent of radioactive substances activities that occur prior to disposal at a geological disposal facility, and for which a permit is required.
[77] Geological Disposal Facilities on Land for Solid Radioactive Wastes, Guidance on requirements for Authorisation, Environment Agency, 2009, available online at: http://bit.ly/1STsINa

4.7.4 Pollution control is concerned with the use of measures to prohibit or limit the releases of substances to the environment from different sources. It also ensures that ambient air and water quality meet standards that guard against impacts to the environment or human health. Environmental Permits mainly regulate discharges and emissions during the construction (development), operation, decommissioning and closure phases of a facility and are limited to activities covered by the Environmental Permitting (England and Wales) Regulations 2016. The Environmental Permit cannot control impacts from sources outside the facility's boundary such as those from traffic movements[78].

4.7.5 In deciding an application, the Secretary of State should consider whether the development itself is an acceptable use of the land. To inform decision making, the Secretary of State should assess the potential impacts of processes, emissions and discharges rather than their control. The Secretary of State should work on the assumption that in terms of the control and enforcement of these factors, the relevant pollution control regime will be properly applied and enforced by the independent regulators. Decisions under the Planning Act should complement but not duplicate those taken under the relevant pollution control regime.

4.7.6 All geological disposal infrastructure will be subject to the permitting regime set out in the Environmental Permitting (England and Wales) Regulations 2016. When a developer applies for an Environmental Permit, the relevant regulator requires that the applicant demonstrates that processes are in place to meet all relevant Environmental Permitting requirements. In considering the impacts of the project, the Examining Authority and Secretary of State may rely on the effective operation of the Environmental Permits.

Marine Licensing

4.7.7 Section 42(1) (aa) of the Planning Act sets out a statutory duty on applicants to consult the Marine Management Organisation on nationally significant infrastructure projects which would affect, or would be likely to affect, any relevant marine areas as defined in section 42(2) of the Planning Act[79]. The Secretary of State's consent may include a deemed Marine Licence[80]; the Marine Management Organisation will advise the Secretary of State on what conditions should apply to the deemed marine licence. Where appropriate, the Marine Management Organisation should actively participate in examinations, and the Examining Authority should engage with such matters, to help ensure that nationally significant infrastructure projects are licensed in accordance with environmental legal requirements.

4.7.8 Any consent granted by the Secretary of State will be able to include provision deeming the grant of a Marine Licence for operations carried out wholly in England, waters adjacent to England up to the seaward limits of the territorial sea. Marine Licences are likely to be required for all the marine elements of the geological disposal infrastructure development, such as the deep borehole tranches, any proposed spoil disposal, and including associated development required as well as under the seabed. Where applicable, development consent applications should be determined in accordance with the Marine Policy Statement, and any applicable marine plans.

[78] More information on Environmental Permits can be found on the Environment Agency's website
[79] As amended by section 23 of the Marine and Costal Access Act 2009.
[80] A marine licence can be deemed to be granted under a Development Consent Order. This is subject to section 149A of the Planning Act which was amended under the Marine and Coastal Access Act 2009.

4.7.9 The Marine and Coastal Access Act 2009 provides for the preparation of a Marine Policy Statement (MPS) and a number of marine plans. The Secretary of State must have regard to the MPS and applicable marine plans in taking any decision which relates to the exercise of any function capable of affecting the whole or any part of the UK marine area[81]. In the event of a conflict between any of these marine planning documents and this NPS, the NPS prevails for the purpose of decision making by the Examining Authority and the Secretary of State, given the national significance of the infrastructure.

4.7.10 The Crown Estate owns virtually the entire seabed out to the 12 nautical mile territorial limit. Therefore, the developer may need to obtain a licence from the Crown Estate prior to any geological disposal infrastructure development.

Active Engagement

4.7.11 Applicants are encouraged to begin pre-application discussions with the relevant regulators as early as possible. This will help ensure that applications take account of all relevant environmental considerations and that the relevant regulators are able to provide timely advice and assurance to the Examining Authority.

4.7.12 The Secretary of State should be satisfied that development consent can be granted taking full account of environmental impacts. This will require close cooperation by the developer with the Environment Agency and/or the relevant pollution control authority, and other relevant bodies, such as the Marine Management Organisation, Natural England, Internal Drainage Boards, local authorities and water and sewerage undertakers as appropriate, to ensure that in the case of a potentially polluting development:

- the relevant pollution control authority is satisfied that potential releases can be adequately regulated under the pollution control framework; and
- the effects of existing sources of pollution in and around the proposed development are not such that the cumulative effects of pollution when the proposed development is added would make that development unacceptable, particularly in relation to statutory environmental quality limits.

4.7.13 As set out in section 2.4 the Secretary of State is entitled to rely on appropriate regulation of impacts in considering development consent, unless there is reason to believe that any relevant necessary operational pollution control permits, or licences or other consents will not subsequently be granted.

4.8 Common Law Nuisance and Statutory Nuisance

4.8.1 Section 158 of the Planning Act provides a defence of statutory authority in civil or criminal proceedings for nuisance. Such a defence is available in respect of both the development for which consent has been granted and anything else authorised by an order granting development consent. The defence does not extinguish the local authority's duties under Part III of the Environmental Protection Act 1990 to inspect its area and take reasonable steps to investigate complaints of statutory nuisance and to serve an abatement notice where satisfied of its existence, likely occurrence, or recurrence.

[81] As defined in section 42 of the Marine and Coastal Act 2009.

4.8.2 It is very important that, during examination of a nationally significant infrastructure project, the Examining Authority considers possible sources of nuisance under section 79(1) of the Environmental Protection Act 1990, and how they may be mitigated or limited. This will enable the Examining Authority to recommend appropriate requirements that the Secretary of State may wish to include in any subsequent Development Consent Order.

4.8.3 The availability of the defence of statutory authority in relation to any particular development is subject to any contrary provision made by the Secretary of State in the order granting development consent (section 158(3) of the Planning Act).

4.9 Safety

4.9.1 The Office for Nuclear Regulation is responsible for the regulation of nuclear safety, conventional health and safety, and security where a nuclear site licence applies in Great Britain. The Health and Safety Executive is responsible for matters relating to conventional workforce safety, including the drilling of deep boreholes and the construction of surface and underground facilities outside of a nuclear site boundary (or where a site licence has not yet been granted). As set out in section 2.4 the Secretary of State is entitled to rely on appropriate regulation of health and safety issues in considering development consent.

4.9.2 The Office for Nuclear Regulation is responsible for considering the operator's application for a site licence under the Nuclear Installations Act 1965. The Office for Nuclear Regulation will consider the capability, organisation and resources of the proposed operator, the nature of the prescribed activities that would take place on the site, the relevant safety case and the nature and location of the site when deciding whether to issue a site licence. The Office for Nuclear Regulation is required to attach such conditions to site licences as it considers necessary or desirable in the interests of safety and it may also attach conditions with respect to the handling, treatment and disposal of nuclear matter. The Office for Nuclear Regulation may require the operator to seek further consent from it to begin certain phases of the construction or operation of the development.

4.9.3 Some geological disposal infrastructure may be subject to the Control of Major Accident Hazards Regulations 2015 (the COMAH Regulations)[82]. These Regulations aim to prevent major accidents involving dangerous substances and limit the consequences for people and the environment of any that do occur. They are enforced by the Competent Authority comprising the Health and Safety Executive, the Environment Agency and the Office for Nuclear Regulation, acting jointly in England. The Secretary of State should be satisfied that the applicant has engaged with the relevant authorities as to whether an assessment is necessary for geological disposal infrastructure to comply with the COMAH Regulations.

[82] www.legislation.gov.uk/uksi/2015/483/pdfs/uksi_20150483_en.pdf

4.10 Health

4.10.1 Geological disposal infrastructure may also have indirect health impacts, for example if it positively or negatively affects access to important public services, employment, transport or use of open space and water for recreation and physical activity.

4.10.2 As described in the relevant sections of this NPS, where the proposed development has an effect on humans, the Environmental Statement (see section 4.2) should assess these effects for each element of the project, identifying any positive or adverse health impacts, and identifying measures to avoid, reduce or compensate for such impacts as appropriate.

4.10.3 A number of these impacts may simultaneously affect people, so the applicant, and the Secretary of State in determining an application for development consent, should consider the cumulative effect on health from these impacts.

4.10.4 The Health and Social Care Act 2012[83] makes provision for the protection or improvement of public health and sets out the Secretary of State's duty in relation to the protection of public health[84]. Under the duty, the Secretary of State must consult the Health and Safety Executive, and have regard to its policies, when taking steps for the protection of the public from ionising or non-ionising radiation.

4.11 Security Considerations

4.11.1 National security considerations apply across all national infrastructure sectors. Overall responsibility for security of the energy sector lies with the Department for Business, Energy and Industrial Strategy (BEIS) which is responsible for the effective functioning of the UK civil nuclear security regime. BEIS works closely with government security agencies including the Centre for the Protection of National Infrastructure (CPNI) to reduce the vulnerability of the most critical infrastructure assets in the sector to terrorism and other national security threats. The Office for Nuclear Regulation through its Civil Nuclear Security and Safeguards (CNSS) division is the security regulator for the UK's civil nuclear industry.

4.11.2 Government policy is to ensure that, where possible, proportionate protective security measures are incorporated into the design of new infrastructure projects at an early stage in the project development. Where applications for development consent for infrastructure covered by this NPS relate to potentially critical infrastructure, there may be national security considerations.

4.11.3 Where national security implications have been identified, the applicant should consult with relevant security experts from the Centre for the Protection of National Infrastructure, the Office for Nuclear Regulation's Civil Nuclear Security and Safeguards (CNSS) division and BEIS to ensure that physical, procedural and personnel security measures have been adequately considered in the design process and that adequate consideration has been given to the management of security risks. If the Centre for the Protection of National Infrastructure, the Office for Nuclear Regulation Civil Nuclear Security Programme and BEIS are satisfied that security issues have been adequately addressed in the project when the application is

[83] www.legislation.gov.uk/ukpga/2012/7/contents/enacted
[84] Section 11 of the Health and Social Care Act 2012 inserts section 2A (Secretary of State's duty as to protection of public health) into the National Health Service Act 2006

submitted to the Examining Authority, they will provide confirmation of this. The Examining Authority should not need to give any further consideration to the details of the security measures in its examination.

4.11.4 The Civil Nuclear Security and Safeguards (CNSS) division of the Office for Nuclear Regulation is responsible for approving security arrangements within the civil nuclear industry and enforcing compliance to prevent the theft or sabotage of nuclear or other radioactive materials, the sabotage of nuclear facilities, and to protect sensitive nuclear information wherever it is held; it does this in accordance with the Nuclear Industries Security Regulations 2003[85] and the Ionising Radiations Regulations 2017.[86] This takes into account the full spectrum of protective measures, including physical protection, personnel security, cyber security and information assurance. The Secretary of State is entitled to rely on appropriate regulation of impacts in considering development consent applications.

[85] www.legislation.gov.uk/uksi/2003/403/contents/made

[86] The Nuclear Security (Secretary of State Security Directions) Regulations 2018 further provide that in the event of an imminent threat to the civil nuclear industry, the Secretary of State may issue a direction to operators in the industry.

5. Impacts

5.1 Introduction

5.1.1 A major infrastructure project has the potential to impact the environment, the economy or communities. The Appraisal of Sustainability Report identified a number of environmental and socio-economic factors that may be impacted by the development of geological disposal infrastructure. How the applicant should assess these impacts, and how the Secretary of State should consider these impacts, is set out below, alongside suggested methods to mitigate any impacts of the infrastructure where appropriate. Where the Secretary of State considers attaching requirements to any grant of development consent, these should not duplicate requirements under existing regulatory regimes.

5.1.2 The following sections set out how the impacts from the Appraisal of Sustainability Report and other impacts of geological disposal infrastructure should be considered. This does not imply that these are the only impacts that might be relevant in any particular case. While particular generic impacts are presented separately in this section, applicants should take account of the links between impacts, for example traffic and transport with air quality and noise.

5.1.3 This NPS covers development in England and territorial waters adjacent to England up to the seaward limits of the territorial sea. Assessments should take account of any impacts these facilities may have in other parts of the UK. Where a proposed development affects cross-border links, developers should also work with the devolved administrations. The government's planning guidance[87], which is referred to in this chapter is likely to be a useful source of guidance on generic impacts.

5.1.4 Sufficient relevant information is crucial to good decision-making, particularly where formal assessments are required; such as Environmental Impact Assessment, Habitats Regulations Assessment and Flood Risk Assessment. To avoid delay, applicants should discuss what information is needed with relevant statutory environmental bodies as early as possible. Statutory environmental bodies should fully engage with and respond to early discussions and the consultation and examination process under the Planning Act to avoid under-resourcing and back-loading the development consent process.

5.2 Air quality

Introduction

5.2.1 The development of geological disposal infrastructure can involve (non-radioactive) emissions to air which could lead to adverse impacts on health, on protected species and habitats, or on the wider countryside.

[87] Planning Practice Guidance available online at: www.gov.uk/government/collections/planning-practice-guidance

5.2.2 The Air Quality Strategy for England, Scotland, Wales and Northern Ireland[88] sets out UK air quality standards and objectives. In addition, the European Union has established common, health-based and ecosystem-based ambient concentration limit values for the main pollutants in Directive 2008/50/EC ('the Air Quality Directive')[89], which Member States are required to meet by various dates. These limit values have been transposed into domestic law in England through the Air Quality Standards Regulations 2010[90].

5.2.3 The air quality effects of the proposed development on wildlife and biodiversity should be assessed in accordance with the Biodiversity and Nature Conservation section of this NPS (section 5.4).

Applicant's Assessment

5.2.4 Where the air pollution impacts of the proposed development are likely to be significant, or cumulatively could lead to a breach of Air Quality Directive limit values or national objectives, the applicant should undertake an assessment of the impacts of the proposed development as part of the Environmental Statement (see also section 4.2)

5.2.5 Air quality considerations are likely to be particularly relevant where geological disposal infrastructure is proposed within or adjacent to Air Quality Management Areas [91], Clean Air Zones or where they may have potential impacts on Natura 2000 sites[92], including those outside England.

5.2.6 The Environmental Statement should describe:

- existing (background) air quality levels;
- any significant air quality effects, associated with the development (both alone and in-combination), their mitigation and any residual effects distinguishing between the project stages, and taking account of any significant emissions from any traffic generated by the project;
- the contribution of air emissions, to site-specific critical levels and loads, for the protection of vegetation and ecosystems after mitigation methods have been applied; and
- contribution of air emissions to ambient air quality after mitigation methods have been applied.

5.2.7 The Department for Environment, Food and Rural Affairs (Defra) publishes future national projections of air quality based on estimates of future levels of emissions, traffic and vehicle fleet. Projections are updated as the evidence base changes. The applicant's assessment should be consistent with this but may include more detailed modelling to demonstrate local impacts. In addition to information on the likely significant effects of a project in relation to the Environmental Impact Assessment, the

[88] www.gov.uk/government/publications/the-air-quality-strategy-for-england-scotland-wales-and-northern-ireland-volume-1
[89] Directive 2008/50/EC on ambient air quality and cleaner air for Europe.
[90] Air Quality Standards Regulations 2010: www.legislation.gov.uk/uksi/2010/1001/contents/made
[91] If a local authority finds any places where the national air quality objectives are not likely to be achieved, it must declare an Air Quality Management Area and put together a plan to improve air quality.
[92] 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 and Special Protection Areas designated respectively under the Habitats Directive and Birds Directive. The network includes both terrestrial and marine sites (Marine Protected Areas (MPAs)).

applicant must provide the Secretary of State with an assessment of the risk that the project would affect the UK's ability to comply with the Air Quality Directive.

Decision Making

5.2.8 The Secretary of State should take into account the presence of Air Quality Management Areas and Clean Air Zones. A proposed development should be consistent with air quality plans produced for both of these.

5.2.9 The Secretary of State should consider air quality impacts over the wider area that is likely to be affected, as well as in the vicinity of a proposed development. In all cases, the Secretary of State must take account of relevant statutory air quality limit values and objectives, including those set out in the Air Quality Standards Regulations 2010 and the Air Quality Strategy for England, Scotland, Wales and Northern Ireland.

5.2.10 Where a proposed development is likely to lead to a breach of the air quality limit values or objectives, the applicant should work with the relevant authorities to secure appropriate mitigation measures, with a view to ensuring, so far as is possible, that those limit values or objectives are not breached. Air quality considerations are likely to be particularly relevant where a development is proposed:

- within or adjacent to Air Quality Management Areas, Clean Air Zones or nature conservation sites (including Natura 2000 sites and Sites of Special Scientific Interest (SSSIs)[93], including those outside England); and
- where changes are sufficient to bring about the need for a new Air Quality Management Areas or Clean Air Zones or change the size of an existing Air Quality Management Areas or Clean Air Zones; or bring about changes to exceedances of the limit values or national objectives, or where they may have the potential to impact on nature conservation sites.

5.2.11 The Secretary of State must give air quality considerations weight where, after taking into account mitigation, a development would lead to a significant adverse air quality impact in relation to the Environmental Impact Assessment or where they lead to deterioration in air quality in agglomeration or non-agglomeration zones[94], Air Quality Management Areas, or Clean Air Zones.

5.2.12 The Secretary of State should refuse consent where, after taking into account mitigation, the air quality impacts of the development will:

- result in a zone or agglomeration which is currently reported as being compliant with the Air Quality Directive becoming non-compliant; or
- affect the ability of a non-compliant area to achieve compliance within the timescales set out in the most recent relevant air quality plan at the time of the decision.

5.2.13 Both deep boreholes and a geological disposal facility will be subject to the Environmental Permitting (England and Wales) Regulations 2016. It is for the Environment Agency to ensure that any air emissions during construction and

[93] Sites of Special Scientific Interest (Area of Special Scientific Interest (ASSI) in Northern Ireland) is a conservation designation denoting a protected area in the United Kingdom. Sites of Special Scientific Interest are the basic building block of site-based nature conservation legislation and most other legal nature/geological conservation designations in Great Britain are based upon them, including national nature reserves, Ramsar sites, Special Protection Areas, and Special Areas of Conservation.

[94] For monitoring and reporting air pollution the UK has been divided into agglomeration zones (areas of urban population > 250,000 people) and non-agglomeration zones.

operation can be adequately regulated under the environmental permitting regime. Regulation and monitoring after decommissioning and closure of the geological disposal infrastructure will be subject to requirements of the Environment Agency until such time as the site is released from regulatory control. The Secretary of State is entitled to rely on appropriate regulation of impacts in considering development consent.

Mitigation

5.2.14 The Secretary of State should be satisfied that the mitigation measures put forward by the applicant, and which are needed in respect of both construction and operational emissions, are acceptable. A construction management plan will help arrange mitigation measures at this stage.

5.2.15 In considering proposed mitigation measures, the Secretary of State may refer to the conditions and advice in the UK Air Quality Strategy or any successor to it.

5.2.16 Reductions in air emissions might be achieved through consideration of location, design and layout; consideration of technologies employed; and consideration of energy use.

5.2.17 Mitigation identified in the section on transport impacts will help mitigate against the effects of air emissions from transport which are not controlled by the Environmental Permit.

5.3 Noise

Introduction

5.3.1. Excessive noise can have wide-ranging impacts on the quality of human life and health (e.g. owing to annoyance or sleep disturbance), use and enjoyment of areas of value (such as quiet places) and areas with high landscape quality. The government's policy is set out in the Noise Policy Statement for England[95]. It promotes good health and good quality of life through effective noise management. Similar considerations apply to vibration, which can also cause damage to buildings. In this section, in line with current legislation, references below to 'noise' apply equally to the assessment of impacts of vibration.

5.3.2. Factors that will determine the likely noise impact include:

- construction noise and the inherent operational noise from the proposed development and its characteristics;
- the proximity of the proposed development to noise-sensitive premises, (including residential properties and schools) and noise-sensitive areas (including certain parks and open spaces);
- the proximity of the proposed development to quiet places and other areas that are particularly valued for their acoustic environment or landscape quality; and
- the proximity of the proposed development to designated sites where noise may have an adverse impact on protected species or other wildlife.

[95] Noise Policy Statement for England, Defra, 2010, available online at: http://bit.ly/1rz75Dj

5.3.3. The noise effects of the proposed development on wildlife and biodiversity should be assessed in accordance with the Biodiversity and Nature Conservation section of this NPS (section 5.4).

Applicant's Assessment

5.3.4. Where noise impacts are likely to arise from geological disposal infrastructure, the applicant should include a noise assessment as part of the Environmental Statement (see section 4.2). That noise assessment should include:

- a description of the noise-generating aspects of the development proposal leading to noise impacts, including the identification of any distinctive tonal, impulsive or low frequency characteristics of the noise;
- identification of noise-sensitive premises and noise-sensitive areas that may be affected;
- the characteristics of the existing noise environment;
- a prediction of how the noise environment will change with the proposed development:
  - in the shorter term, such as during the construction period;
  - in the longer term, during the operating life of the infrastructure, and post-closure; and
  - at particular times of the day, evening and night as appropriate;
- an assessment of the effect of predicted changes in the noise environment on any noise-sensitive premises and noise-sensitive areas;
- if likely to cause disturbance, an assessment of the effect of underwater or subterranean noise; and
- measures to be employed in mitigating the effects of noise. Applicants should consider using best available techniques to reduce noise impacts.

5.3.5. The nature and extent of the noise assessment should be proportionate to the likely noise impact.

5.3.6. The potential noise impact of ancillary activities associated with the development, such as increased road and rail traffic movements, or other forms of transportation, should also be considered as appropriate.

5.3.7. Operational noise, with respect to human receptors, should be assessed using the principles of the relevant British Standards[96] and other guidance. For the prediction, assessment and management of construction noise, reference should be made to any relevant British Standards and other guidance which also give examples of mitigation strategies.

5.3.8. The applicant should consult the Environment Agency and/or the Marine Management Organisation (where relevant) on the likely scope of an Environmental Statement and should consult Natural England in particular with regard to assessment of noise on protected species or other wildlife. The results of any noise

[96] As published by the British Standards Institution, available online at: www.bsigroup.com/

surveys and predictions may inform the ecological assessment. The seasonality of potentially affected species in nearby sites may also need to be taken into account.

Decision Making

5.3.9. A development must be undertaken in accordance with statutory requirements for noise. Due regard must have been given to the relevant sections of the Noise Policy Statement for England, the National Planning Policy Framework, and the government's associated planning guidance on noise.

5.3.10. The proposed development should demonstrate good design through selection of the quietest cost-effective approach available; containment of noise within buildings wherever possible; optimisation of facility layout to minimise noise emissions; and, where possible, the use of landscaping or noise barriers to reduce noise transmission.

5.3.11. The Secretary of State should consider 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.

5.3.12. In determining an application, the Secretary of State should consider whether mitigation measures are needed both for construction noise and operational noise, over and above any which may form part of the development application. The Secretary of State may wish to impose requirements to ensure delivery of all mitigation measures. This is to ensure that the noise levels from the proposed development do not exceed those described in the assessment or any other estimates on which the decision was based.

5.3.13. Applicants should propose appropriate mitigation measures to limit the impact of any noise emissions on amenity.

5.3.14. For those processes in a development which would be subject to the Environmental Permitting regime, the Secretary of State may assume that the regime will exercise the necessary controls over noise impacts. However, the Secretary of State must take into account the potential impact from all noise sources when deciding whether or not to grant development consent and, if so, on what terms.

Mitigation

5.3.15. Mitigation measures for the project should be proportionate and reasonable and may include one or more of the following:

- engineering: containment of noise generated;
- materials: use of materials that reduce noise (for example, low noise road surfacing);
- lay-out: adequate distance between source and noise-sensitive receptors; incorporating good design to minimise noise transmissions through screening by natural or purpose-built barriers;

- administration: specifying acceptable noise limits or times of use (e.g. in the case of the geological disposal facility building site's public announcement systems).

5.3.16. In certain situations, and only when all other forms of noise mitigation have been exhausted, the applicant may consider it appropriate to provide noise mitigation through improved sound insulation to dwellings or, in extreme cases, through compulsory acquisition of affected properties. This is to gain consent for what might otherwise be unacceptable development. Where mitigation is proposed to be dealt with through compulsory acquisition, such properties would have to be included within the application in relation to which compulsory acquisition powers were being sought.

5.4 Biodiversity and Nature Conservation (including flora and fauna)

Introduction

5.4.1 Biodiversity is the variety of life in all its forms, encompassing plants, animals and other organisms as well as the complex ecosystems of which they are a part. government policy for the natural environment is set out in the 25 Year Environment Plan[97]. This plan sets out government action to help the natural world regain and retain good health. It aims to deliver cleaner air and water in our cities and rural landscapes, protect threatened species and provide richer wildlife habitats. The plan sets out a vision of improving the environment and tackling climate change within a generation. The plan seeks to embed a 'net environmental gain' principle for development to deliver environmental improvements locally and nationally. The purpose of nature conservation is to maintain and enrich biodiversity and conserve important geological and/or geomorphological sites[98]. Nature conservation also acts to preserve the natural systems that provide food, fresh water and clean air.

5.4.2 The national and international laws that can impact on planning decisions affecting biodiversity and geological conservation issues are set out in a Government Circular[99].

Applicant's Assessment

5.4.3 The applicant should ensure that the Environmental Statement clearly sets out any likely significant impacts on internationally, nationally and locally designated sites of ecological or geological conservation importance (including those outside England). The Environmental Statement must also consider the full range of potential impacts on ecosystems including habitats, protected species or species identified as being of principal importance to biodiversity and nature conservation. The applicant may wish to refer to the Appraisal of Sustainability and Habitats Regulations Assessment reports that accompany this NPS.

5.4.4 As a geological disposal facility has both surface and underground infrastructure it is important for the applicant to also consider the likely significant impacts to the

[97] 25 Year Environment Plan, available online at www.gov.uk/government/publications/25-year-environment-plan
[98] A list of designated sites (including marine sites) is included in the Geological Conservation Review held by the Joint Nature Conservation Committee (JNCC).
[99] Government Circular: Biodiversity and Geological Conservation – Statutory Obligations and their Impact within the Planning System (ODPM 06/2005, Defra 01/2005).

subterranean environment. These include subterranean Sites of Special Scientific Interest and habitats.

5.4.5 In line with the 25 Year Environment Plan, the applicant should show how the development would take advantage of opportunities to conserve and enhance biodiversity and geological conservation interests, and aim, where possible, to achieve net environmental gains.

Decision making

5.4.6 The government's biodiversity strategy is set out in 'Biodiversity 2020: A Strategy for England's wildlife and ecosystem services'[100], and the 25 Year Environmental Plan[101]. These strategies, supported by the National Planning Policy Framework[102], have the aim of establishing a net gain in biodiversity, supporting healthy well-functioning ecosystems and establishing coherent ecological networks that are more resilient to current and future pressures, with more and better places for nature to benefit wildlife and people. This aim needs to be viewed in the context of the challenge of climate change: failure to address this challenge may result in a significant impact on biodiversity.

5.4.7 As a general principle and subject to the specific policies below, development should avoid significant harm to biodiversity and geological conservation interests, including through mitigation and consideration of reasonable alternatives. The applicant may also wish to make use of biodiversity offsetting[103] in devising compensation proposals to counteract any impacts on biodiversity which cannot be avoided or mitigated. Where significant harm cannot be avoided or mitigated, as a last resort, appropriate compensation measures should be sought. In taking decisions, the Secretary of State should ensure that appropriate weight is attached to designated sites of international, national and local importance, irreplaceable habitats including ancient woodland and ancient and veteran trees, 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.

5.4.8 Where applicable, the Examining Authority and Secretary of State should consider the effects of a proposal on marine ecology and biodiversity taking into account all relevant information made available to it. Adverse effects of development in a marine environment could include underwater noise and a loss of habitat. This may lead to negative effects on spawning, overwintering, nursery and feeding grounds and migratory pathways in the marine area.

[100] Biodiversity 2020: A Strategy for England's wildlife and ecosystem services – Published 2011, available online at: www.gov.uk/government/uploads/system/uploads/attachment_data/file/69446/pb13583-biodiversity-strategy-2020-111111.pdf.

[101] The 25 Year Environmental Plan available at: www.gov.uk/government/publications/25-year-environment-plan

[102] National Planning Policy Framework 2018, www.gov.uk/government/publications/national-planning-policy-framework--2

[103] Biodiversity offsets are measurable conservation outcomes resulting from actions designed to compensate for residual adverse biodiversity impacts arising from a development after mitigating measures have been taken. The goal of biodiversity offsets is to achieve no net loss and preferably a net gain of biodiversity.

International Sites

5.4.9 The Habitats Regulations provide statutory protection for habitat sites[104]. The National Planning Policy Framework states that the following wildlife sites should have the same protection as habitat sites:

- potential Special Protection Areas (pSPA) and possible Special Areas of Conservation (pSAC);
- listed or proposed Ramsar sites[105]; and
- sites identified, or required, as compensatory measures for adverse effects on habitat sites, potential Special Protection Areas, possible Special Areas of Conservation and listed or proposed Ramsar sites.

5.4.10 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 habitat site.

Sites of Special Scientific Interest (SSSIs)

5.4.11 Many SSSIs are also designated as habitat sites and will be protected accordingly. Those that are not, or those features of SSSIs not covered by an international designation, are given a high degree of protection through the Habitats Directive. All National Nature Reserves are notified as SSSIs.

5.4.12 For proposed surface facilities within or outside a SSSI that are likely to have significant adverse effects on a SSSI (either individually or in combination with other developments), development consent should not normally be granted. Where an adverse effect on the site's notified special interest features is likely, an exception should be made only where the benefits of the development at this site clearly outweigh:

- the impacts that it is likely to have on the features of the site that make it of special scientific interest; and
- any broader impacts on the national network of SSSIs.

5.4.13 The Secretary of State should ensure that the applicant's proposals to mitigate the harmful aspects of the development and, where possible, to ensure the conservation and enhancement of the site's biodiversity or geological interest, are acceptable. Where necessary, requirements or planning obligations should be used to ensure these proposals are delivered.

Marine Conservation Zones (MCZs)

5.4.14 Marine Conservation Zones introduced under the Marine and Coastal Access Act 2009[106], are areas that have been designated for the purpose of conserving marine flora or fauna, marine habitat or types of marine habitat or features of geological or geomorphological interest. The protected feature or features and the conservation objectives for the Marine Conservation Zones are stated in the relevant Marine

[104] 'Habitat Sites' include candidate Special Areas of Conservation, Sites of Community Importance, Special Areas of Conservation and Special Protection Areas, and is defined in regulation 8 of the Conservation of Habitats and Species Regulations 2017.
[105] Potential Special Protection Areas, possible Special Areas of Conservation and proposed Ramsar sites are sites on which government has initiated public consultation on the scientific case for designation as a Special Protection Area, candidate Special Area of Conservation or Ramsar site.
[106] Marine and Coastal Access Act 2009: www.legislation.gov.uk/ukpga/2009/23/contents

Conservation Zones designation orders, which provide statutory protection for these areas. Measures to restrict damaging activities will be implemented by the Marine Management Organisation and other relevant organisations. As a public authority, the Secretary of State is bound by the duties in relation to Marine Conservation Zones imposed by sections 125 and 126 of the Marine and Coastal Access Act 2009.

Regional and Local Sites

5.4.15 Sites of regional and local biodiversity and geological interest, which include Regionally Important Geological Sites, Local Nature Reserves and Local Sites, have a fundamental role to play in:

- meeting overall national biodiversity targets;
- contributing to the quality of life and the well-being of the community; and
- supporting research and education.

The Secretary of State should give due consideration to such regional or local designation. However, given the need for geological disposal infrastructure, these designations should not be used in themselves to refuse development consent.

Ancient Woodland, and Ancient and Veteran Trees

5.4.16 Ancient woodland is a valuable biodiversity resource both for its diversity of species and for its longevity as woodland. Once lost it cannot be recreated. As is set out in the National Planning Policy Framework, the Secretary of State should refuse any development consent for any development that would result in the loss or deterioration of irreplaceable habitats, including ancient woodland and the loss of ancient or veteran trees found outside ancient woodland, unless there are wholly exceptional reasons, for example where the need for and benefits of the development, in that location, would clearly outweigh the loss or deterioration of the habitat, and a suitable compensation strategy exists

Biodiversity within and around developments

5.4.17 Development proposals potentially provide many opportunities for building in beneficial biodiversity or geological features as part of good design through the provision of 'green infrastructure'[107]. When considering proposals, the Secretary of State should consider whether the applicant has maximised such opportunities in and around developments. The Secretary of State may use requirements or planning obligations where appropriate to ensure that such beneficial features are delivered.

Protection of Other Habitats and Species

5.4.18 Many individual wildlife species receive statutory protection under a range of legislative provisions[108].

[107] Nature can be used to provide important services for communities by protecting them against flooding or excessive heat, or helping to improve air, soil and water quality. It can also be used as a barrier to noise and light impacts, as well as enhancing local landscape character and could potentially provide health and wellbeing benefits. It could also provide a positive impact on biodiversity by providing green corridors that connect the wider landscape. A key feature in the 25 Year Environmental Plan is to create more green infrastructure, working with other government departments and non-governmental bodies. When nature is harnessed by people and used as an infrastructural system it is called 'green infrastructure'.

[108] Certain plant and animal species, including most wild birds, are protected under the Wildlife and Countryside Act 1981. European plant and animal species are protected under the Conservation of Habitats and Species Regulations 2017. Some other animals are protected under specific legislation.

5.4.19 Other species and habitats have been identified as being of principal importance for the conservation of biodiversity and thereby requiring conservation action. The Secretary of State should ensure that applicants have taken measures to ensure these species and habitats are protected from the adverse effects of development. Where appropriate, requirements or planning obligations may be used to deliver this protection. The Secretary of State should refuse consent where harm to the habitats or species and their habitats would result, unless the benefits of the development (including need) clearly outweigh that harm.

Mitigation

5.4.20 Applicants should include appropriate mitigation measures as an integral part of their proposed development including identifying where and how they are proposed to be secured. In particular, the applicant should demonstrate that:

- during construction, they will seek to ensure that activities will be confined to the minimum areas required for the works;
- during construction and operation best practice will be followed to ensure that risk of disturbance or damage to species or habitats is minimised, including as a consequence of transport access arrangements;
- habitats will, where practicable, be restored after construction works have finished;
- they will carry out the development in a way that is consistent with the 25 Year Environment Plan and associated policies;
- a development will be designed and landscaped to avoid habitat fragmentation and to provide green corridors for the movement of species; and
- opportunities will be taken to enhance existing habitats and, where practicable, to create new habitats of value within the site landscaping proposals.

5.4.21 Applicants should address the mitigation hierarchy (which supports efforts to conserve and enhance biodiversity), which is set out in the National Planning Policy Framework[109].

5.4.22 The Secretary of State should consider whether appropriate requirements should be attached to any consent, or included in any planning obligations entered into, to ensure that mitigation measures are delivered.

5.4.23 The Secretary of State will need to take account of:

- what mitigation measures may have been agreed between the applicant and Natural England and/or the Marine Management Organisation; and
- whether Natural England and/or or the Marine Management Organisation has granted or refused, or intends to grant or refuse, any relevant licences, including protected species mitigation licences.

[109] National Planning Policy Framework available at: www.gov.uk/government/publications/national-planning-policy-framework--2

5.5 Climatic factors including climate change and adaptation

Introduction

5.5.1 Anthropogenic activities continue to increase the concentration of greenhouse gases in the atmosphere. The Climate Change Act 2008 established a legally binding target to reduce the UK's greenhouse gas emissions to at least 80% below 1990 levels by 2050[110]. The Paris Agreement[111] marked a clear turning point towards a sustainable and low carbon future, requiring countries to have national mitigation plans to reduce emissions, with the goal of keeping global warming below 2 °C.

5.5.2 Geological disposal infrastructure will aid the government in reaching these targets by enabling the development of new, low-carbon nuclear power plants. The implementation of new nuclear power plants requires the government to be satisfied that effective arrangements exist or will exist to manage and dispose of the waste they will produce. Geological disposal satisfies this requirement.

5.5.3 Regardless of greenhouse gas emissions reductions by states across the world, average global temperatures are expected to rise over the next century. The resulting effect on the UK climate has implications over time periods relevant to developing geological disposal infrastructure from construction through to closure.

Applicant's Assessment

5.5.4 Carbon impacts should be considered as part of the appraisal of the development options, prior to the submission of an application for development consent.

5.5.5 While it is unlikely that the development of geological disposal facility infrastructure will adversely affect the government's ability to meet its emissions targets, the applicant should provide evidence of the carbon impact of the development and an assessment of emissions associated with construction against government targets.

5.5.6 The applicant should consider the carbon impact of different materials used in the construction of the facility and operational procedures to reduce emissions.

5.5.7 The applicant should also show that the development is resilient to a changing climate over the lifetime of the proposed development. It should be demonstrated that both surface and underground parts of a facility are adaptable to changes in climate over the length of operation. Long term climate changes on a geological timescale will be dealt with through the environmental safety case for the facility that the developer will agree with the Environment Agency. The applicant need not demonstrate underground facilities' resilience to these changes in climate during the post-closure phase in the development consent application, as this will be part of the environmental safety case and assessment by the Environment Agency before the grant of the environmental permit.

[110] On 12 June 2019, the Prime Minister announced that, following advice from the independent Committee on Climate Change, the UK would eradicate its net contribution to climate change by 2050. The Climate Change Act 2008 (2050 Target Amendment) Order 2019 came into force on 27 June 2019 and amends the Climate Change Act 2008 to replace the 80% target for the reduction in the UK's greenhouse gas emissions with a target of net zero.

[111] At the Paris climate conference (COP21) in December 2015, 195 countries adopted the first-ever universal, legally binding global climate deal: http://ec.europa.eu/clima/policies/international/negotiations/future/index_en.htm

Decision Making

5.5.8 The Carbon Plan 2011[112] is the government's overarching national carbon reduction strategy. It is a credible plan for meeting carbon budgets and the government is legally obliged to meet these plans (or plans set out in any successor document).

5.5.9 An increase in emissions resulting from the development of geological disposal infrastructure is not a reason to refuse development consent, unless the resulting increase in carbon emissions is so significant that it would have a material impact on the ability of government to meet its carbon reduction targets. When assessing emissions as a result of the development, the Secretary of State should take into account that:

- nuclear power is a low carbon form of electricity generation;
- government policy is that before consent is granted for the development of new nuclear power stations, government should be satisfied that arrangements exist or will exist to manage and dispose of the waste they produce;
- geological disposal infrastructure provides this management and disposal solution and is therefore an enabler for low carbon new nuclear power.

5.5.10 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.

Mitigation

5.5.11 To mitigate the contribution any geological disposal infrastructure will make to climate change, its carbon footprint should be minimised. Within safety and operational constraints, the design of the geological disposal facility, including configuration and layout and use of materials, should be considered in terms of the emissions impact; as deep boreholes may be comparatively short-lived developments, there may be no need to take account of climate change adaptation, as stated in section 4.6. The Secretary of State will consider the effectiveness of such mitigation measures to ensure that, in relation to design and construction, the carbon footprint is as low as reasonably practicable. The Secretary of State's view of the adequacy of the mitigation measures relating to design and construction will be a material factor in the decision-making process.

5.6 Historic Environment

Introduction

5.6.1 The construction and operation of geological disposal infrastructure has the potential to result in adverse impacts on the historic environment above, at and below the surface.

5.6.2 The historic environment includes all aspects of the environment resulting from the interaction between people and places through time, including all surviving physical

[112] 'The Carbon Plan: Delivering our low carbon future' - published December 2011: www.gov.uk/government/publications/the-carbon-plan-reducing-greenhouse-gas-emissions--2

remains of past human activity, whether visible, buried or submerged, and landscaped and planted or managed flora.

5.6.3 Those elements of the historic environment that hold value to this and future generations because of their historic, archaeological, architectural or artistic interest are called 'heritage assets'. Heritage assets may be buildings, monuments, sites, places, areas or landscapes, or any combination of these. The sum of the heritage interests that a heritage asset holds is referred to as its significance. Significance derives not only from a heritage asset's physical presence, but also from its setting[113].

5.6.4 Some heritage assets have a level of significance that justifies official designation. Categories of designated heritage assets are World Heritage Sites, Scheduled Monuments, Listed Buildings, Protected Wreck Sites, Protected Military Remains, Registered Parks and Gardens, Registered Battlefields; and Conservation Areas[114].

5.6.5 Non-designated heritage assets of archaeological interest[115] that are demonstrably of equivalent significance to Scheduled Monuments, should be considered subject to the policies for designated heritage assets. The absence of designation for such heritage assets does not indicate lower significance.

5.6.6 The Secretary of State should also consider the impacts on other non-designated heritage assets (as identified either through the development plan process by local authorities, including 'local listing', or through the application, examination and decision making process). This is on the basis of clear evidence that such heritage assets have a significance that merits consideration in that process, even though those assets are of lesser value than designated heritage assets.

Applicant's assessment

5.6.7 The applicant should undertake an assessment of any likely significant heritage impacts of the proposed development as part of the Environmental Impact Assessment and describe these in the Environmental Statement (see section 4.2). This should include consideration of heritage assets above, at, and below the surface.

5.6.8 The applicant should describe the significance of any heritage assets affected, including any contribution made by their setting. The level of detail should be proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance. As a minimum, the relevant Historic Environment Record[116] should have been consulted and the heritage assets assessed using appropriate expertise. Where a site on which development is proposed includes, or has the potential to include, heritage assets with archaeological

[113] Setting of a heritage asset is the surroundings in which it is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate that significance or may be neutral.
[114] The issuing of licences to undertake works on Protected Wreck Sites in territorial waters adjacent to England is the responsibility of the Secretary of State for Digital, Culture, Media and Sport and does not form part of Development Consent Orders. The issuing of licences for Protected Military Remains is the responsibility of the Secretary of State for Defence.
[115] There will be archaeological interest in a heritage asset if it holds, or potentially may hold, evidence of past human activity worthy of expert investigation at some point.
[116] Historic Environment Records are information services maintained by local authorities and National Park Authorities with a view to providing access to comprehensive and dynamic resources relating to the historic environment of an area for public benefit and use. Details of Historic Environment Records in England are available from the Heritage Gateway website. Historic England should also be consulted, where relevant.

interest, the applicant should include an appropriate desk-based assessment and, where necessary, a field evaluation. The applicant should ensure that the extent of the impact of the proposed development on the significance of any heritage asset affected can be adequately understood from the application and supporting documents. Studies will be required on those heritage assets affected by noise, vibration, light and indirect impacts, the extent and detail of these studies will be proportionate to the significance of the heritage asset affected. Where proposed development will affect the setting of a heritage asset, accurate representative visualisations may be necessary to assess impact[117].

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

- enhancing, through a range of measures such as sensitive design, the significance of heritage assets or setting affected;
- considering measures that address those heritage assets which are at risk or which may become at risk, as a result of the scheme; and
- considering how visual or noise impacts can affect heritage assets, and whether there may be opportunities to enhance access to, or interpretation, understanding and appreciation of, the heritage assets affected by the scheme.

Careful consideration in preparing the scheme will be required on whether the impacts on the historic environment will be direct or indirect, temporary or permanent.

Decision making

5.6.10 In determining applications, the Secretary of State should seek to identify and consider the particular significance of any heritage asset that may be affected by the proposed development (including assets whose setting may be affected by the proposed development), taking account of the available evidence and any necessary expertise from:

- relevant information provided with the application and, where applicable, relevant information submitted during examination of the application;
- any designation records included on the National Heritage List for England;
- historic landscape character records;
- the relevant Historic Environment Record(s) and similar sources of information;
- representations made by interested parties during the examination process; and
- expert advice, where appropriate, and when the need to understand the significance of the heritage asset demands it.

[117] Relevant guidance is given in the Historic England publication, The Setting of Heritage Assets (https://www.historicengland.org.uk/images-books/publications/gpa3-setting-of-heritageassets/)

5.6.11 The Secretary of State must also comply with the requirements on listed buildings, conservation areas and scheduled monuments set out in the Infrastructure Planning (Decisions) Regulations 2010[118].

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

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

5.6.14 When considering the impact of a proposed development on the significance of a designated heritage asset, the Secretary of State should give great weight to the asset's conservation. The more important the asset, the greater the weight should be. This is irrespective of whether any potential harm amounts to substantial harm, total loss or less than substantial harm to its significance. Any harm or loss of significance of a designated heritage asset (from its alteration or destruction, or from development within its setting) should require clear and convincing justification. Substantial harm to or loss of a grade II Listed Building or a grade II Registered Park or Garden should be exceptional. Substantial harm to or loss of assets of the highest significance, including World Heritage Sites, Scheduled Monuments, grade I & II* Listed Buildings, Protected Wreck Sites, Registered Battlefields, and grade I & II* Registered Parks and Gardens should be wholly exceptional.

5.6.15 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.

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

[118] Infrastructure Planning (Decisions) Regulations 2010, available online at www.legislation.gov.uk/uksi/2010/305/regulation/3/made

5.6.17 As referred to in the National Planning Policy Framework the effect of an application on the significance of a non-designated heritage asset should be taken into account in determining the application. In weighing applications that directly or indirectly affect non-designated heritage assets, a balanced judgement will be required having regard to the scale of any harm or loss and the significance of the heritage asset.

5.6.18 Not all elements of a World Heritage Site or Conservation Area will necessarily contribute to its significance. The Secretary of State should treat the loss of a building (or other element) that makes a positive contribution to their significance either as substantial harm or less than substantial harm, as appropriate. This should be considered by taking into account the relative significance of the elements affected and their contribution to the significance of the Conservation Area or World Heritage Site as a whole.

5.6.19 Where the loss of significance of any heritage asset has been justified by the applicant based on the merits of the new development and the significance of the asset in question, the Secretary of State should consider:

- imposing a requirement in the Development Consent Order, or;
- requiring the applicant to enter into an obligation,

that will prevent the loss occurring until the relevant part of the development has commenced, or it is reasonably certain that the relevant part of the development is to proceed.

5.6.20 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.

5.6.21 Where there is evidence of deliberate neglect of, or damage to, a heritage asset, the Secretary of State should not take its deteriorated state into account in any decision.[119]

Mitigation by Recording

5.6.22 A documentary record of our past is not as valuable as retaining the heritage asset and therefore the ability to record evidence of the asset should not be a factor in deciding whether consent should be given.

5.6.23 Where the loss of the whole or part of a heritage asset's significance is justified, the Secretary of State should require the applicant to record and advance understanding of the significance of the heritage asset before it is lost wholly or in part. The extent of the requirement should be proportionate to the nature and level of the asset's significance. Applicants should be required to publish this evidence and to deposit copies of the reports with the relevant Historic Environment Record. They should also be required to deposit the archive generated in a local museum or other public depository willing to receive it.

[119] Historic Environment Good Practice Advice in Planning 2 provides further advice on managing significance in decision-taking in the historic environment, available online at: https://historicengland.org.uk/images-books/publications/gpa2-managing-significance-in-decision-taking/

5.6.24 The Secretary of State may add requirements to the Development Consent Order to ensure that this is undertaken in a timely manner in accordance with a written scheme of investigation that meets the requirements of this section and has been agreed in writing with the relevant local authority (or, where the development is in English waters, the Marine Management Organisation) and Historic England and that the completion of the exercise is properly secured[120].

5.6.25 Where there is a high probability that a development site may include as yet undiscovered heritage assets with archaeological interest, the Secretary of State should consider imposing requirements to ensure that appropriate procedures are in place for the identification and treatment of such assets discovered during construction.

5.7 Socio-economics, Population and Demographics

Introduction

5.7.1 Due to the long term nature of some geological disposal infrastructure development, there is the possibility a geological disposal facility may have long term effects on the population and demographics of an area.

5.7.2 Construction and operation of geological disposal infrastructure may have economic impacts at local and regional levels. Developers should look to maximise employment opportunities and aim to create the training opportunities to improve the skill level of the local population, whilst working with national and government training organisations. Developers should also work with local resources and organisations to ensure all employment opportunities during construction and operation of geological disposal infrastructure are effectively communicated. In addition, the use of sustainable materials from local suppliers is encouraged.

Applicant's Assessment

5.7.3 Applicants should demonstrate that with any geological disposal infrastructure development, they have taken steps to ensure that the entire demographic, including all equality groups[121], in the area is considered. The applicant should consider how the impacts of geological disposal infrastructure, such as socio-economics, visual impacts and traffic and transport may affect the social infrastructure and amenities available to local communities.

5.7.4 Applicants should describe the existing socio-economic conditions, in the areas surrounding the proposed development, following appropriate consultation with those most affected, and should refer to how the development's socio-economic impacts correlate with local planning policies.

5.7.5 Applicants should undertake a thorough socio-economic impact assessment, in order to identify any likely, significant positive and negative socio-economic impacts. The assessment should look at the potential impacts over the operational lifetime of the

[120] Guidance on the contents of a written scheme of investigation is set out in Historic Environment Good Practice Advice in Planning: 2 - Managing Significance in Decision - Taking in the Historic Environment.
[121] 'Equality groups' is used to refer to people or communities who face discrimination or social exclusion due to personal characteristics (e.g. gender, race).

proposed development, and the potential impacts of its closure so far as is reasonable.

5.7.6 The assessment should cover any socio-economic impacts appropriate to the proposed development. Examples include:

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

5.7.7 The changing influx of workers during construction, operation (construction will continue through most of the operation phase of the geological disposal facility) and eventual closure/sealing phases of the geological disposal infrastructure may alter the demand for services and facilities in the areas surrounding the proposed development. This could change the local population dynamics and could alter the demand for services and facilities in the settlements nearest to the construction work (including community facilities and physical infrastructure such as energy, water, transport and waste). There could also be effects on social cohesion depending on how populations and service provision change as a result of the development.

5.7.8 Cumulative effects on communities should be assessed. For example, if development consent, or consent under other regimes, were to be granted for a number of infrastructure projects within a region and these were developed in a similar timeframe, there could be some short-term negative effects. For instance, a potential shortage of construction workers to meet the needs of other industries and major projects within the region.

5.7.9 A geological disposal facility would provide a variety of jobs. Many of the on-site functions are relatively labour-intensive and there would also be a number of highly skilled jobs available. As such, new job and skills development opportunities are likely to arise. Applications should assess related issues such as the availability of a suitable workforce and the potential wider and longer-term benefits to the economy.

5.7.10 In considering alternative site locations, the developer should take account of potential impacts of alternative project options in respect of any adverse effects on different groups of the population. Potential impacts on pollution and noise in respect of any adverse effects on equality groups should also be taken into account, for example by carrying out an equalities impact assessment.

5.7.11 Socio-economic impacts may be linked to other impacts, for example, the visual impact or an individual's perception of a development. It may also have an impact on local businesses or property value. Where such impacts are relevant to the development, an applicant should include them in their assessments.

Decision Making

5.7.12 Prior to making a development consent application, the applicant should have undertaken a public consultation programme to understand the needs and concerns of local communities and acted upon, or have plans to act upon, the outcome of this where appropriate. The applicant should work to establish robust local skills partnerships with the host community, in order to maximise local benefits.

5.7.13 The Secretary of State should have regard to the potential socio-economic impacts of new geological disposal infrastructure identified by the applicant in the socio-economic assessment. It should be reasonable for the Secretary of State to conclude that speculative assertions of socio-economic impacts, not supported by evidence, should be given little weight (particularly in view of the need for geological disposal infrastructure as set out in this NPS).

5.7.14 The Secretary of State should 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.

5.7.15 The Secretary of State should also have regard to the elements of applications that have a focus on improving skills and maximising employment opportunities in the local area, including the extent to which this will benefit the local, and in turn the national, economy.

Mitigation

5.7.16 The Secretary of State should consider whether the mitigation measures put forward by the applicant are acceptable to mitigate any adverse socio-economic impacts of the development. For example, high quality design and/or screening (e.g. by natural features) can improve the visual and environmental experience for visitors and the local community alike.

5.7.17 The Secretary of State should only grant development consent where the measures put forward by the applicant to mitigate any adverse equalities impacts are acceptable.

5.8 Flood risk and Coastal Change

Introduction

5.8.1 Flooding is a natural process that plays an important role in shaping the natural environment. However, flooding can threaten life and causes substantial damage to property. The effects of weather events on the natural environment, life and property can be exacerbated as a consequence of decisions about the location, design and nature of development and land use, and as a potential consequence of future climate change. Although flooding cannot be wholly prevented, its adverse impacts can be avoided or reduced through good planning and management. Additionally, where surface facilities of a geological disposal facility or deep boreholes are proposed near the coast, coastal change is an important consideration.

Flood Risk

5.8.2 Climate change over the operational lifetime of the geological disposal facility could lead to an increased flood risk in areas susceptible to flooding, and to an increased risk of flooding in areas which are not currently thought of as being at risk. The applicant, the Examining Authority and the Secretary of State (in taking decisions) should consider the risk of flooding also in the context of climate change. More information about assessment principles and impacts of climate change can be found in sections 4.6 and 5.5 respectively.

5.8.3 The National Planning Policy Framework aims to prevent inappropriate development in areas at risk of flooding by directing development away from areas at highest risk, whether existing or future. Where development is necessary in such areas, policy aims to ensure safety without increasing flood risk elsewhere and, where possible, by reducing flood risk overall. This NPS follows the same principles. Further guidance can be found in the Planning Practice Guidance[122] supporting the National Planning Policy Framework.

Coastal Change

5.8.4 The construction of surface facilities and deep boreholes near the coast may involve, for example, dredging, dredge spoil deposition, marine landing facility construction and flood and coastal protection measures which could result in direct effects on the coastline, seabed, marine ecology and biodiversity, and the historic environment. The applicant should consider how geological disposal infrastructure could act as a driver of coastal change while also considering how to ensure that a development is resilient to on-going and potential future coastal change.

5.8.5 If underground facilities are to be located under the seabed, the applicant should consult the Marine Management Organisation at an early stage.

5.8.6 Indirect changes to the coastline and seabed might arise as a result of a hydrodynamic response to direct changes. Applicants should consider the extent to which this could lead to localised or more widespread coastal erosion or accretion and changes to offshore features such as submerged banks and ridges, marine biodiversity and the historic environment.

Applicant's Assessment

Flood Risk

5.8.7 Applications for geological disposal surface facilities of one hectare or greater in Flood Zone 1[123] and all proposals for geological disposal surface facilities located in Flood Zones 2 and 3 should be accompanied by a site-specific flood risk assessment. A flood risk assessment will also be required where geological disposal surface infrastructure of less than one hectare may be subject to sources of flooding other than rivers and the sea (e.g. surface water, groundwater); land identified in a strategic flood risk assessment as being at increased flood risk in the future; or, where the Environment Agency has notified the local planning authority that there are critical drainage problems.

5.8.8 For local flood risk (surface water, groundwater and ordinary watercourse flooding), local flood risk management strategies and surface water management plans provide useful sources of information for consideration in flood risk assessments. Surface water flood issues need to be understood and these issues taken into account; for example, flow routes should be clearly identified and managed.

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[122] The Planning Practice Guidance supporting the National Planning Policy Framework, available online at: http://planningguidance.communities.gov.uk/blog/guidance/flood-risk-and-coastal-change/

[123] The Flood Zones refer to the probability of flooding from rivers, the sea and tidal sources and ignore the presence of existing defences, because these can be breached, overtopped and may not be in existence for the lifetime of the development. The definition of Flood Zones (in England) can be found in the Planning Practice Guidance or the Town and Country Planning (Development Management Procedure) (England) Order 2015, Schedule 4. The Environment Agency's Flood Maps is available online at: www.environment-agency.gov.uk/homeandleisure/37837.aspx. Their maps of Groundwater Protection Zones is available online at: www.environment-agency.gov.uk/homeandleisure/37833.aspx

5.8.9 The flood risk assessment should identify and assess the risks of all forms of flooding to and from the infrastructure, both now and in the future, and demonstrate how these flood risks will be managed, taking climate change into account.

5.8.10 In preparing a flood risk assessment the developer should:

- consider the risk of all forms of flooding arising from the geological disposal infrastructure in addition to the risk of flooding to the infrastructure; demonstrate how these risks will be managed, and where relevant mitigated, so that the development remains safe throughout its lifetime and does not increase flood risk elsewhere[124];
- consider both the potential adverse and beneficial effects of flood risk management infrastructure, including raised defences, flow channels, flood storage areas and other artificial features, together with the consequences of their failure;
- consider and quantify the different types of flooding (whether from natural and human sources and including joint and cumulative effects) and identify flood risk reduction measures, so that assessments are fit for the purpose of the decisions being made;
- take the impacts of climate change into account, clearly stating the development lifetime over which the assessment has been made;
- in addition to meeting requirements in section 5.5 of this NPS, identify the potential effects of the credible maximum climate change scenario in the most recent projections of marine and coastal flooding and demonstrate that in principle adaptation would be possible;
- demonstrate that further measures for flood management could be achieved at the site in the future if future climate change predictions show they are necessary;
- consider the vulnerability of those using the geological disposal infrastructure, including arrangements for safe access and escape routes include; the assessment of the residual risk after risk reduction measures have been taken into account; and demonstrate that this is acceptable for the proposed geological disposal infrastructure;
- consider how the ability of water to soak into the ground may change with development, along with how the proposed layout of the infrastructure may affect drainage systems; and
- provide the evidence for the Secretary of State to apply the Sequential Test and Exception Test[125], as appropriate.

5.8.11 Geological disposal infrastructure may be affected by (or may add to) flood risk if it is within a defined zone of high flood risk, or if the development is likely to change the surface hydrology of the area significantly. Applicants are advised to engage in

[124] Updated flood maps for rivers, the sea, surface water and reservoirs are available on the Environment Agency's website

[125] A Sequential Test is applied to planning applications to ensure that new development is located in areas at lowest flood risk as far as possible. An Exception Test is applied to certain applications where development is proposed in a flood risk area (e.g. where alternative sites are not available in a lower flood risk area), to demonstrate that the development is justified and can be made safe. Further details of the Sequential Test and Exception Test can be found in the National Planning Policy Framework: www.gov.uk/government/publications/national-planning-policy-framework--2

sufficiently early pre-application discussions with the Environment Agency and the relevant lead local flood authority (and, where relevant, other flood risk management bodies such as Internal Drainage Boards, sewerage undertakers, highways authorities and reservoir owners and operators). Such discussions can be used to identify the likelihood and possible extent and nature of the flood risk, to help scope the flood risk assessment. Additionally, they can identify the information that will be required by the Secretary of State to reach a decision on the application once it has been submitted and examined.

5.8.12 During the assessment of a new nuclear facility, the Office for Nuclear Regulation considers the applicant's safety case for protection against external hazards[126] such as flooding. Any site-specific elements that may impact safety should be justified by the applicant at a later date as agreed with the Office for Nuclear Regulation[127].

Coastal Change

5.8.13 This NPS does not preclude development of geological disposal infrastructure under the seabed so long as development is within UK territorial waters adjacent to England (up to the seaward limits of the territorial sea).

5.8.14 Applications for development in a Coastal Change Management Area (CCMA) should make it clear why there is a need for it to be located in a Coastal Change Management Area[128]. Applicants should consult the local planning authority, EA and other relevant bodies on the scope of an assessment of the vulnerability of the proposed development to coastal change, to help demonstrate its appropriateness in such a location. This should take account of climate change, during the infrastructure's operational life and any decommissioning period.

5.8.15 For a proposed development involving dredging or in the marine environment, the applicant should consult the Marine Management Organisation at an early stage. The applicant should also consult the Marine Management Organisation on a proposed development which could impact on coastal change, since the Marine Management Organisation may also be involved in considering a proposed development which may have related coastal impacts.

5.8.16 The applicant should examine the broader context of coastal protection around the proposed site and the influence in both directions, i.e. coast on site and site on coast[129].

5.8.17 The applicant should be particularly careful to identify any effects of physical changes on the integrity and special features of Marine Conservation Zones, candidate marine Special Areas of Conservation, coastal Special Areas of Conservation and candidate coastal Special Areas of Conservation, coastal Special Protection Areas and potential coastal Special Protection Areas, Ramsar sites, Sites of Community Importance

[126] The Office for Nuclear Regulation's judgments are guided by the following: ONR Safety Assessment Principles www.onr.org.uk/saps/saps2014.pdf; Technical Assessment Guide 13 www.onr.org.uk/operational/tech_asst_guides/ns-tast-gd-013.pdf; ONR and EA Joint Advice Note - Principles for Flood and Coastal Erosion Risk Management; international standards and guidance.

[127] The Office for Nuclear Regulation is a statutory consultee to the Planning Inspectorate (PINS) which rules on the suitability of a particular design on a particular site for planning purposes. Nuclear safety issues are deferred to the Office for Nuclear Regulation to allow it to confirm that that the planning application and inquiry decision do not undermine the nuclear safety aspects (affected by external hazards such as flooding) that will be considered subsequently by the Office for Nuclear Regulation.

[128] Coastal Change Management Areas are areas identified in Local Plans as likely to be affected by coastal change (physical change to the shoreline through erosion, coastal landslip, permanent inundation or coastal accretion).

[129] The relevant information will include Shoreline Management Plans.

(SCIs) and potential Sites of Community Importance and Sites of Special Scientific Interest.

5.8.18 During the assessment of a new nuclear facility, the Office for Nuclear Regulation considers the applicant's safety case for protection against external hazards such as coastal change. Any site-specific elements that may impact safety should be justified by the applicant at a later date as agreed with the Office for Nuclear Regulation.

Decision making

Flood Risk

The Sequential Test (Flood Risk)

5.8.19 Preference should be given to locating the surface-based parts[130] of a geological disposal facility or any deep boreholes in areas where the risk of flooding, both now and in the future, taking all sources of flood risk into account, is lowest. The aim should be to keep development out of current and future medium and high flood risk areas. The Sequential Test should consider the spatial variation of risk within medium and then high flood risk areas to identify the lowest risk sites in those areas. This should be based on:

- the Flood Zones
- appropriate information on climate change; and
- other sources of flooding (e.g. surface water flood risk mapping, historical evidence of flooding, and groundwater flood risk).

5.8.20 If there is no reasonable available site[131] in low flood risk areas, then consideration should be given to locating that infrastructure in medium flood risk areas. If there is no reasonable available site in low or medium flood risk areas, then that infrastructure may be located in a high flood risk area, subject to the Exception Test. Development consent should not be granted for development where any part of the surface facilities of a geological disposal facility is located in Flood Zone 3b. Development consent should only be granted for development in respect of deep boreholes where those boreholes are located in whole or in part in Flood Zone 3b where there are no other reasonable alternative locations. Whilst the surface facilities of a geological disposal facility should take account of Flood Zones, an applicant is not precluded from developing the underground parts of a geological disposal facility beneath Flood Zones.

The Exception Test (Flood Risk)

5.8.21 Where the Sequential Test has been applied but, consistent with wider sustainability objectives, it is not possible for the development to be located in areas of lower flood risk than Flood Zone 3a, the Exception Test should be applied. The test provides a

[130] Flooding will not affect the underground facility that is at least 200 metres underground as water will not have a route down to these areas. It is for these reasons that a geological disposal facility could potentially be located off-shore.

[131] Guidance on interpreting the term 'reasonable available site' in this test can be found in the Planning Practice Guide which accompanies the National Planning Policy Framework. The applicant should justify with evidence to the Examining Authority what area of search has been used in examining whether there are reasonable available sites. This will allow the Examining Authority to consider whether the Sequential Test has been made as part of site selection.

method of managing flood risk while still allowing necessary development to occur and is not a tool to justify development in flood risk areas when the Sequential Test has already shown that there are reasonable alternative lower risk sites appropriate for the proposed development to be steered to.

5.8.22 The Exception Test is only appropriate for use where the Sequential Test alone cannot deliver an acceptable site, taking into account the need for geological disposal infrastructure to remain operational during floods.

5.8.23 Both elements of the Exception Test will have to be passed for development to be consented. For the Exception Test to be passed:

- it must be demonstrated that the project provides wider sustainability benefits to the community[132] that outweigh flood risk; and
- a strategic or site-specific flood risk assessment should demonstrate that the proposed development will be safe from flooding for its operational lifetime and beyond closure, taking account of the vulnerability of its users, without increasing flood risk elsewhere and, where possible, identify opportunities for reducing flood risk overall.

5.8.24 The Flood Risk Assessment should demonstrate suitable flood risk mitigation measures. These mitigation measures should take account of the potential effects of the credible maximum climate change scenario in the most recent marine and coastal flood projections. Applicants should demonstrate that future adaptation/flood mitigation would be achievable at the site of the geological disposal facility, after any buildings are constructed, to allow for any future credible predictions that might arise during the life of the surface facilities.

5.8.25 In addition, any infrastructure for the geological disposal facility that is classified as essential infrastructure[133] and proposed to be located in Flood Zone 3a or 3b should be designed and constructed to remain operational and safe for users in times of flood; and any proposed development in Flood Zone 3b should result in no net loss of floodplain storage and not impede water flows.

Application for development consent

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

- the application is supported by an appropriate flood risk assessment;
- the Sequential Test has been applied as part of site selection and, if required, the Exception Test as set out in the Planning Practice Guidance supporting the National Planning Policy Framework;
- a sequential approach has been applied at the site level to minimise risk by directing the most vulnerable development to areas of lowest flood risk, unless there are overriding reasons to prefer a different location;

[132] These would include the benefits (including need) for, the infrastructure set out in Chapter 3 of this NPS.
[133] Essential infrastructure includes essential utility infrastructure which has to be located in a flood risk area (or coastal change management area) for operational reasons, including electricity generation power stations and grid and primary and sub-stations.

- in areas at risk of flooding, priority has been given to the use of sustainable drainage systems (SuDS). The systems used should, where possible, provide multifunctional benefits;
- in flood risk areas, the infrastructure is appropriately flood resilient and resistant, including safe access and escape routes where required, and any residual risk can be safely managed over the lifetime of the development.

5.8.27 For construction work which has drainage implications[134], approval for the infrastructure's drainage system will form part of any development consent issued by the Secretary of State. The Secretary of State expects sustainable drainage systems for the management of run-off to be put in place, unless demonstrated to be inappropriate, for the proposed development[135].

5.8.28 The Secretary of State will therefore need to be satisfied that:

- having regard to the Planning Practice Guidance and the non-statutory technical standards for sustainable drainage systems[136], that the proposed minimum standards of operation are appropriate;
- there are clear arrangements in place, through the use of requirements or planning obligations, for on-going maintenance over the operational lifetime of the facility, including any necessary access rights to property;
- the sustainable drainage systems should be designed to ensure that the maintenance and operational requirements are economically proportionate;
- the most appropriate body is being given the responsibility for maintaining any sustainable drainage systems, taking into account the nature and security of the infrastructure on the proposed site.

5.8.29 If the Environment Agency or the lead local flood authority have concerns and maintain an objection to the grant of development consent on the grounds of flood risk, the Secretary of State may grant consent so long as they are satisfied that all reasonable steps have been taken by the applicant and the Environment Agency or the lead local flood authority as appropriate to mitigate the risks.

5.8.30 The Secretary of State should not consent development in Flood Zone 2 unless satisfied that the Sequential Test requirements have been met. Development should not be consented in Flood Zone 3 unless the Secretary of State is satisfied that the Sequential and Exception Test requirements have been met. It may be the case that a site for potential geological disposal infrastructure has been included in a development plan on an allocated site and has therefore been assessed and informed by a strategic flood risk assessment (which has undertaken the Sequential Test). When applying for development consent for such as site, applicants need not apply the sequential test, but should apply the sequential approach[137] provided there have been no significant changes to the understood level of flood risk to the site, now or in the future, which would have affected the outcome of the Sequential Test.

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[134] As defined in paragraph 7(2) of Schedule 3 to the Flood and Water Management Act 2010.
[135] Nationally significant infrastructure projects as defined in section 14 of the Planning Act 2008, including waste development.
[136] 'Non-statutory technical standards for sustainable drainage systems', Defra, March 2014, available online at: www.gov.uk/government/publications/sustainable-drainage-systems-non-statutory-technical-standards
[137] Further guidance on the sequential approach is available online at: www.gov.uk/government/uploads/system/uploads/attachment_data/file/6000/2115548.pdf

Coastal Change

5.8.31 When assessing applications in a Coastal Change Management Area, the Secretary of State should be satisfied that 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.

5.8.32 Essential infrastructure may be granted development consent in a Coastal Change Management Area, provided there are clear plans to manage the impacts of coastal change on it, and it will not have an adverse impact on rates of coastal change elsewhere.

5.8.33 In addition to this NPS, the Secretary of State must have regard to the appropriate marine policy documents, as provided for in the Marine and Coastal Access Act 2009, in taking any decision which relates to the exercise of any function capable of affecting any part of the UK marine area. The Secretary of State may also have regard to any relevant Shoreline Management Plans[138]. In the event of a conflict between any of these marine policy documents and this NPS, the NPS prevails for the purposes of decision making given the national significance of the infrastructure.

5.8.34 Great weight should be attached to the risks of flooding and coastal erosion. The applicant must demonstrate that full account has been taken of the policy on assessment and mitigation in this NPS, taking account of the potential effects of climate change on these risks as discussed above, or any sudden changes in the protection afforded to a particular site.

Mitigation

Flood Risk

5.8.35 To satisfactorily manage flood risk and the impact of the natural water cycle on people, property and ecosystems, good design and infrastructure may need to be secured through use of planning requirements or obligations. These may include the use of multifunctional sustainable drainage systems, appropriate green infrastructure, and the planting of vegetation to help to slow run-off, hold back peak flows and make landscapes more able to absorb the impact of severe weather events.

5.8.36 Surface-based aspects of geological disposal infrastructure which has to be located in flood risk areas should be designed to remain operational when floods occur.

5.8.37 The receipt of, and response to, warnings of floods is an essential element in the management of the residual risk of flooding. Flood warning and evacuation plans should be in place for those areas identified as at risk of flooding. The applicant should take advice from the emergency services when producing an evacuation plan

[138] Shoreline management plans are developed by Coastal Groups with members mainly from local councils and the Environment Agency. They identify the most sustainable approach to managing the flood and coastal erosion risks to the coastline in the short term (0 to 20 years), medium term (20 to 50 years) and the long term (50 to 100 years). The Shoreline Management Plan is available online at: www.gov.uk/government/publications/shoreline-management-plans-smps

for the proposed development as part of the flood risk assessment. Any emergency planning documents, flood warning and evacuation procedures that are required should be identified in the flood risk assessment.

5.8.38 The Secretary of State should consider whether the applicant has made suitable proposals to mitigate flood risk. If necessary, appropriate requirements should be attached to any development consent or planning obligations entered into. The Secretary of State should only grant development consent where the arrangements to mitigate flood risks are acceptable.

Coastal Change

5.8.39 Applicants should propose adequate mitigation measures to address adverse physical changes to the coast in consultation with the Marine Management Organisation, the Environment Agency, Local Planning Authorities, other statutory consultees, Coastal Partnerships and other coastal groups, as they consider appropriate. If necessary, appropriate requirements should be attached to any development consent or planning obligations entered into. The Secretary of State should only grant development consent where the arrangements to mitigate any adverse physical changes to the coast are acceptable.

5.8.40 The Secretary of State should also ensure appropriate development in a Coastal Change Management Area is not affected by coastal change, by limiting the planned life-time of the proposed development of surface-based aspects of geological disposal infrastructure where appropriate; for example, by including temporary permission and restoration conditions where necessary to reduce the risk to people and the development.

5.9 Human Health

Introduction

5.9.1 Geological disposal infrastructure has the potential to impact both positively and negatively on the health and wellbeing of the population. A permanent disposal solution for potentially harmful radioactive materials has clear benefits for the population and future generations; however, the possibility of some adverse effects must not be discounted.

5.9.2 An appropriately located, well-run and well-regulated, geological disposal facility operated in line with current environmental control techniques and standards should pose little risk to human health. However, developing geological disposal infrastructure could directly impact health and wellbeing by increasing traffic, air pollution, dust, odour, water pollution, noise and artificial light. Furthermore, perceptions of the health risks associated with geological disposal infrastructure could lead to anxiety and stress.

5.9.3 Potential radiological impacts on the health of workers are regulated by the Health and Safety Executive and the Office for Nuclear Regulation; and the Environment Agency regulates potential radiological impacts on the public. Directive

2013/59/Euratom[139] and the Ionising Radiations Regulations 2017[140] (and associated legislation) lay down basic safety standards for the protection against the dangers arising from ionising radiation. Environmental effects are covered by the Environmental Permitting (England and Wales) Regulations 2016 requirements as discussed in section 4.2.

Applicant's Assessment

5.9.4 The applicant should ensure that the impacts on the health of the public are considered over the operational lifetime of the facility and post-closure. This should include any significant human health impacts identified as a result of assessment of other generic impacts in chapter 5 of this NPS and their combined effects. Consideration of the impacts on human health, including cumulative impacts should be included in the Environmental Statement (see section 4.2). The impacts on the health of workers over the operational lifetime of the facility will be considered as part of the regulatory process of operational health and safety. In considering these impacts, the Examining Authority may rely on the effective operation of the regulatory regime.

5.9.5 The applicant should also consider any indirect health impacts that arise as a result of development. For example, if it in some way affects access to important public services, transport or the use of open space for recreation and physical activity.

5.9.6 The applicant should work with the local authority and the local Clinical Commissioning Group (CCG)[141] to identify any potentially significant health impacts and appropriate mitigation measures at a given site. Where such measures relate to public information on the extent of risk in relation to radiological hazard, the applicant should consult Public Health England on the appropriate standards for radiological protection.

5.9.7 Radiological impacts on workers, the public and the environment will be assessed by the Office for Nuclear Regulation and the Environment Agency in safety submissions provided by the developer. These safety cases will inform the independent regulators' decisions on a Nuclear Site Licence and Environmental Permits. These permissions are not a prerequisite to granting development consent and are separate from the planning process.

Decision Making

5.9.8 The detailed consideration of the implications, if any, for human health is the responsibility of the independent regulators. However, planning operates in the public interest to ensure that the location of proposed development is acceptable, and health can be material to such decisions. The Secretary of State should take account of health concerns when setting requirements relating to the range of impacts set out in this NPS.

[139] Council Directive 2013/59/Euratom on of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation

[140] The Ionising Radiations Regulations 2017, SI No 1075, available online at: www.legislation.gov.uk/uksi/2017/1075/pdfs/uksi_20171075_en.pdf These regulations implemented aspects of the EU Basic Safety Standards Directive in Great Britain.

[141] Clinical Commissioning Groups are NHS organisations set up by the Health and Social Care Act 2012 to organise the delivery of NHS services in England.

5.9.9 The Secretary of State should also consider the positive effect of employment and other socio-economic impacts (see section 5.7 above) on human health and well-being.

5.9.10 The Secretary of State should act on the basis that the regulatory regime will be properly applied and enforced to protect human health.

Mitigation

5.9.11 The Secretary of State should act on the basis that the risk of adverse effects resulting from exposure to radiation for workers, the public and the environment will be adequately mitigated because of the need to satisfy the requirements of the UK's strict legislative and regulatory regime.

5.10 Landscape and Visual Impacts

Introduction

5.10.1 The landscape and visual impacts of a proposed development will vary on a case-by-case basis according to the type of development, its location and the landscape setting of the proposed development. In this context, references to landscape should be taken as covering local landscape, waterscape and townscape character and quality, where appropriate.

Applicant's Assessment

5.10.2 The applicant should undertake an assessment of any likely significant landscape and visual impacts and describe these in the Environmental Statement (see section 4.2). A guide has been produced to assist in addressing landscape issues[142]. The landscape and visual assessment should include reference to any landscape character assessment and associated studies as a means of assessing landscape impacts relevant to the proposed development. The applicant's assessment should also take account of any relevant policies based on these assessments in local development in England.

5.10.3 The applicant's assessment should include the effects during construction of the proposed development and the significant effects of the completed development and its operation on landscape components and landscape character (including historic landscape characterisation).

5.10.4 The assessment should include the visibility, conspicuousness and potential impacts on views and visual amenity of any proposed development during construction and operation. This should include any noise and light pollution effects, including on local amenity, tranquillity and nature conservation.

5.10.5 Legislation already provides a high degree of protection for National Parks and Areas of Outstanding Natural Beauty and this NPS reinforces this in the context of geological disposal. Any application for development consent within, or to affect land in, a National Park or an Area of Outstanding Natural Beauty would need to comply with the respective duties in the National Parks and Access to Countryside Act 1949[143] and the Countryside and Rights of Way Act 2000[144].

5.10.6 Where geological disposal infrastructure would require significant road widening or the building of new roads in National Parks and the Broads, applicants also need to

[142] Landscape Institute and Institute of Environmental Management and Assessment (2013, 3rd edition): 'Guidelines for Landscape and Visual Impact Assessment Impact Assessment'.
[143] Section 11A of National Parks and Access to the Countryside Act 1949, chapter 97, available online at: www.legislation.gov.uk/ukpga/Geo6/12-13-14/97
[144] Section 85 of Countryside and Rights of Way Act 2000, chapter 37, available online at: www.legislation.gov.uk/ukpga/2000/37/section/85

fulfil the requirements set out in Defra's 'English National Parks and the Broads: UK Government Vision and Circular 2010'. These requirements should also be complied with for significant road widening or the building of new roads in Areas of Outstanding Natural Beauty.

5.10.7 It may be helpful for applicants to draw attention, in the supporting evidence to their applications, to any examples of existing permitted infrastructure they are aware of with a similar magnitude of impact on sensitive receptors. Although each application will need to be looked at on its merits, this may assist the Secretary of State in judging the weight that should be given to the assessed visual impacts of the proposed development.

Decision Making

Landscape Character Impact

5.10.8 Landscape effects depend on the existing character of the local landscape, its current quality, how highly it is valued and its capacity to accommodate change. All of these factors need to be considered in judging the impact of a proposed development on landscape. In taking decisions, the Secretary of State should consider whether the project has been designed carefully, taking account of environmental effects on the landscape and siting, operational and other relevant constraints, to avoid adverse effects on landscape or to minimise harm to the landscape, including by reasonable mitigation where possible and appropriate.

Development proposed within nationally designated areas

5.10.9 This NPS has taken account of national planning policy set out in the National Planning Policy Framework and the protection granted by legislation to National Parks, the Broads and Areas of Outstanding Natural Beauty. Great weight should be given to conserving landscape and scenic beauty in nationally designated areas. National Parks, the Broads and Areas of Outstanding Natural Beauty have the highest status of protection in relation to landscape and scenic beauty. Each of these designated areas has specific statutory purposes which help ensure their continued protection and which the Secretary of State has a statutory duty to have regard to in decisions[145]. The conservation of the natural beauty of the landscape and countryside should be given great weight by the Secretary of State in deciding on applications for development consent in these areas.

5.10.10 The NPS is non-site specific, focussing on the high-level assessment principles against which development consent applications will be considered for geological disposal infrastructure in England, and does not identify specific sites or areas. If development is proposed in a nationally designated area, the Secretary of State should refuse development consent in these areas except in exceptional circumstances and where it can be demonstrated that it is in the public interest. Consideration of such applications should include an assessment of:

[145] For an explanation of the statutory purposes and of the duties which will apply, see 'Duties on relevant authorities to have regard to the purposes of National Parks, Areas of Outstanding Natural Beauty and the Norfolk and Suffolk Broads', available online at: www.bipsolutions.com/docstore/pdf/9947.pdf

- the need for the development, including in terms of any national considerations[146] and the impact of consenting, or not consenting it, upon the local and national economies;
- the cost of, and scope for, developing elsewhere outside the designated area; and
- any detrimental effect on the environment, the landscape and recreational opportunities, and the extent to which that could be moderated.

5.10.11 Where development consent for geological disposal infrastructure is granted in these areas, the Secretary of State should be satisfied that the applicant has ensured that the proposed development will be carried out to as high environmental standards as possible, 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.

Developments outside nationally designated areas which might affect them

5.10.12 The duty to have regard to the purposes of nationally designated areas also applies when considering applications for development outside the boundaries of these areas which may have impacts within them. The aim should be to avoid compromising the purposes of designation and such development should be designed sensitively given the various siting, operational and other relevant constraints. This duty also applies to developments in England which may have impacts on designated areas in Wales or on National Scenic Areas in Scotland.

5.10.13 Whilst underground parts of geological disposal infrastructure will have no visual impact, surface-based parts of the infrastructure will form part of the development. The visibility of the surface development from within a designated area should not in itself be a reason for refusing consent.

Developments in other areas

5.10.14 Outside nationally designated areas, there are landscapes that may be highly valued locally and protected by local designation. Where an applicable local development document in England includes policies on landscape character assessment, these should be given particular consideration. However, local landscape designations should not be used in themselves as reasons to refuse consent, as this may unduly restrict acceptable development.

5.10.15 The scale of some surface-based parts of geological disposal infrastructure means that it could be visible many miles from the site. However, the visual impact from deep borehole development would be time-limited. The Secretary of State should not grant consent if any adverse impacts on the landscape would be so damaging that they cannot be offset by the benefits (including need) of the development.

Visual impact

5.10.16 The Secretary of State will have to consider whether the visual effects on sensitive receptors, such as visual impact for local residents, and other receptors, such as visitors to the local area, outweigh the benefits of the development. Coastal areas are

[146] National considerations should be understood to include the national need for the infrastructure as set out in Chapter 3 and the contribution of the infrastructure to the national economy.

particularly vulnerable to visual intrusion because of the potential high visibility of development on the foreshore, on the skyline and along stretches of undeveloped coast, especially those defined as Heritage Coast[147].

Mitigation

5.10.17 Within a defined area, adverse landscape and visual effects may be minimised through appropriate siting of surface-based infrastructure. Surface-based facilities may have an element of flexibility in their siting as they may not need to be placed directly above the site of proposed underground operations. The applicant should consider visual, and other, impacts when siting surface facilities within reasonable cost constraints. Design (including colours and materials) and landscaping schemes (including sinking development to a lower topographic level) may also be considered in the design of surface infrastructure.

5.10.18 Depending on the topography of the surrounding terrain and areas of population, it may be appropriate to undertake landscaping off-site; for example, filling in gaps in existing tree and hedge lines might mitigate the impact when viewed from a distance. Where the applicant sought consent for such landscaping from the Secretary of State, it would have to be included within the order limits for the application. The applicant should consider reasonable and proportionate mitigation methods, taking into account the extent of the visual impact of, and the amount of time for which, any infrastructure will cause an adverse impact on the landscape.

5.11 Land use

Introduction

5.11.1 Access to high quality open spaces[148] and the countryside and opportunities for sport and recreation can be a means of providing necessary mitigation and/or compensation requirements. Green infrastructure[149] can also enable developments to provide positive environmental and economic benefits.

5.11.2 The re-use of previously developed land for new development can make a major contribution to sustainable development by reducing the amount of countryside and undeveloped greenfield land that needs to be used. Green Belts, defined in a development plan[150], are situated around certain cities and built-up areas. The fundamental aim of Green Belt policy is to prevent urban sprawl by keeping land permanently open; the essential characteristics of Green Belts are their openness and their permanence. For further information on the purposes of Green Belt policy, see the National Planning Policy Framework.

[147] See further information in the National Planning Policy Framework available at: www.gov.uk/government/publications/national-planning-policy-framework--2

[148] Open space is defined in the Town and Country Planning Act 1990 as land laid out as a public garden, or used for the purposes of public recreation, or land which is a disused burial ground. However, in applying the policies in this section, open space should be taken to mean all open space of public value, including not just land, but also areas of water (such as rivers, canals, lakes and reservoirs) which offer important opportunities for sport and recreation and can act as a visual amenity.

[149] Green infrastructure is a network of multi-functional green and blue (streams, canals, rivers etc.) spaces, both new and existing, both rural and urban, which supports the natural and ecological processes and is integral to the health and quality of life of sustainable communities.

[150] Or else so designated under the Green Belt (London and Home Counties) Act 1938.

5.11.3 Geological conservation relates to sites that are designated for their geology and/or their geomorphological[151] importance (see also section 5.4 of this NPS on Biodiversity and Nature Conservation).

5.11.4 Geological disposal infrastructure also has the potential to inhibit the exploitation and production of natural resources within or in proximity to the infrastructure.

Applicant's Assessment

5.11.5 The Environmental Statement (see section 4.2) should identify:

- existing and proposed[152] land-uses near the development;
- the effects of replacing an existing development; and
- whether the use of the site with the proposed development could prevent a development or use on a neighbouring site from continuing.

If the proposed geological disposal infrastructure would prevent a new development or a use proposed in a development plan, the applicant should make an assessment of the effects of preventing that development or use.

5.11.6 Applicants considering proposals which would involve development on open space, sports or recreational buildings and land should have regard to the local authority's assessment and will need to consult the local community. Taking account of the consultations, applicants should consider providing new or additional open space including green infrastructure, sport or recreation facilities (to substitute for any losses as a result of their proposal). Applicants should use any up-to-date local authority assessment or, if there is none, provide an independent assessment to show whether the existing open space, sports and recreational buildings and land is surplus to requirements.

5.11.7 During any pre-application discussions with the applicant, the local planning authority should identify any concerns it has about the impact of the application on land-use. In doing so, the local planning authority should have regard to the development plan and relevant applications and including, where relevant, whether it agrees with any independent assessment that the land is surplus to requirements.

5.11.8 Applicants should take into account the economic and other benefits of land. Applicants should seek to minimise impacts on the best and most versatile agricultural land (defined by the Defra-owned Agricultural Land Classification system as land in grades 1, 2 and 3a). Where significant development on agricultural land is demonstrated to be necessary, applicants should use poorer quality land (grades 3b, 4 and 5) where possible to minimise impacts on soil quality (except where doing so would be inconsistent with other sustainability considerations). Applicants should also identify any effects on soil quality and show how they would minimise those effects, including by proposing appropriate mitigation measures.

5.11.9 The general policies controlling development in the countryside apply with equal force in Green Belts; however, there is, in addition, a general presumption against inappropriate development within them. Such development should not be approved

[151] A list of designated sites (including marine sites) is included in the Geological Conservation Review held by the Joint Nature Conservation Committee.
[152] For example, where a planning application has been submitted.

except in very special circumstances. Applicants should therefore determine whether their proposal, or any part of it, is within an established Green Belt and, if it is, whether their proposal may be inappropriate development within the meaning of Green Belt policy[153].

5.11.10 Infilling or redevelopment of major developed sites in the Green Belt, if identified as such by the local planning authority, may be suitable for geological disposal infrastructure. It may help to secure jobs and prosperity without further prejudicing the Green Belt or offer the opportunity for environmental improvement. Applicants should refer to relevant criteria[154] on such a development in Green Belts.

5.11.11 An applicant may be able to demonstrate that a deep borehole, in relation to Green Belt policy may be considered as an 'engineering operation' rather than a building, and therefore may not be inappropriate development provided it preserves the openness of the Green Belt and does not conflict with the purposes of including land within the Green Belt. It may also be possible for an applicant to show that the physical characteristics of proposed surface-based parts of geological disposal infrastructure are such that it would have no adverse effects which could conflict with the fundamental purposes of Green Belt designation.

5.11.12 An applicant for geological disposal infrastructure may find that the only viable sites for meeting the need for geological disposal infrastructure are on Green Belt land. An applicant needs to recognise the special protection given to Green Belt land. The applicant would need to demonstrate that very special circumstances existed to justify the grant of development consent for development that is inappropriate in terms of Green Belt policy.

5.11.13 Where the proposed development is likely to have an effect on the availability of mineral or hydrocarbon resources the applicant should undertake an assessment of the existing status of resources and any impacts of the proposed development on their availability.

Decision Making

5.11.14 Where the proposed development conflicts with a proposal in a development plan or emerging development plan, the Secretary of State should take account of the stage which the development plan document in England has reached. In deciding what weight to give to the plan for the purposes of determining the planning significance of what would be replaced, prevented or precluded, the closer the development plan document (in England) is to being adopted by the local planning authority, the greater the weight which can be attached to the impact of the proposal on that development plan[155].

5.11.15 The Secretary of State should be satisfied that for development on existing open space, sports and recreational buildings and land:

- an assessment has been undertaken, either by the local authority or independently, which has shown the open space or the buildings and land to be surplus to requirements; or

[153] See National Planning Policy Framework for further information: www.gov.uk/government/publications/national-planning-policy-framework--2
[154] See National Planning Policy Framework paragraph 145.
[155] See the National Planning Policy Framework for national policy on the weight to be given to policies in emerging plans.

- the benefits of the development (including need), outweigh the potential loss of such facilities, taking into account any positive proposals made by the applicant to provide new, improved or compensatory land or facilities. The loss of open space, sports and recreation buildings and land, should only be allowed where an applicant can demonstrate that they will be replaced with facilities of equivalent or better quantity or quality in a suitable location. Where section 131 and 132 of the Planning Act apply, any replacement land provided under those sections will need to conform to the requirements of those sections.

5.11.16 Where networks of green infrastructure have been identified in development plans, they should normally be protected from development and, where possible, strengthened by or integrated within it.

5.11.17 The Secretary of State should ensure that justification is provided where an applicant seeks development consent for infrastructure to be located on the best and most versatile agricultural land. The Secretary of State should give little weight to the loss of poorer quality agricultural land (in grades 3b, 4 and 5), except in areas (such as uplands) where particular agricultural practices may themselves contribute to the quality and character of the environment or the local economy. The Secretary of State should also take account of any loss of high quality soil, including by having regard to the value of peat for biodiversity and as a carbon store, as well as taking account of whether the proposal gives rise to any risk of soil contamination.

5.11.18 In considering the impact on maintaining coastal recreation sites and features, the Secretary of State should expect an applicant to have taken advantage of opportunities to maintain and enhance access to the coast. In doing so, the Secretary of State should consider the implications of development for the creation of a continuous signed and managed route around the coast, as provided for in the Marine and Coastal Access Act 2009.

5.11.19 When located in the Green Belt, some geological disposal infrastructure may be deemed inappropriate development. The Secretary of State will need to assess whether there are very special circumstances to justify development consent for inappropriate development. Very special circumstances will not exist unless the harm by reason of inappropriateness, and any other harm, is clearly outweighed by other considerations. In view of the presumption against inappropriate development (as set out in the National Planning Policy Framework), the Secretary of State will attach great weight to the harm to the Green Belt when considering any application for such development.

5.11.20 The Secretary of State should consider whether the proposed development will have a significant impact on the recovery of natural resources, including minerals and hydrocarbons. Should the Secretary of State deem the loss (economic or otherwise) of natural resources as a result of the proposed development to be too great, development consent should be refused.

Mitigation

5.11.21 An applicant should seek to minimise the direct effects of proposed development on the existing use of the proposed site, or proposed uses near the site, by the application of good design principles, including the layout of the proposed development.

5.11.22 Where green infrastructure is affected, the Secretary of State should consider imposing requirements to ensure the connectivity of the green infrastructure network

is maintained in the vicinity of the development and that any necessary works are undertaken, where possible, to mitigate any adverse impact.

5.11.23 Where a proposed development has a sterilising effect on land use there may be scope for this to be mitigated through, for example, using or incorporating the land for nature conservation or wildlife corridors or for parking and storage in employment areas.

5.11.24 Coastal access, rights of way, National Trails and other rights of access to land are important recreational facilities, for example, for walkers, cyclists and horse riders. Applicants are expected to propose appropriate mitigation measures to address adverse effects on coastal access, National Trails and other rights of way. Where this is not the case, the Secretary of State should consider what appropriate mitigation requirements might be attached to any grant of development consent.

5.11.25 Where significant disruption to the recovery of natural resources cannot be avoided or mitigated, as a last resort, appropriate compensation measures should be sought, and imposed by the Secretary of State. If these cannot be met, development consent should not be granted.

5.12 Traffic and Transport

Introduction

5.12.1 The transport of materials, goods and personnel to and from a geological disposal infrastructure site can have a variety of impacts, on the surrounding transport infrastructure and potentially on connecting transport networks, during the lifetime of the development (e.g. through increased congestion). Impacts may result particularly from increases in noise and emissions from road transport.

5.12.2 The Office for Nuclear Regulation is responsible for regulation of the civil nuclear industry including regulating the safety and security of the transport of radioactive material by road and rail in Great Britain. The Office for Nuclear Regulation also advises on the transportation of radioactive material by air and sea within the United Kingdom's territorial waters. The Office for Nuclear Regulation carries out a range of regulatory activities to assure the safe transport of radioactive materials. Approval is granted for the designs of packages used to carry high-hazard radioactive materials to ensure they meet exacting international safety standards, and the packages are built to robust quality assurance plans and are correctly used and maintained. Regulation is also carried out through a programme of targeted, risk-informed inspections and engagement with duty holders which may lead to interventions. Inspections examine the management systems utilised by duty holders, as well as compliance with safety and security legal requirements.

Applicant’s assessment

5.12.3 If a proposed development is likely to have significant transport implications, the applicant’s Environmental Statement (see section 4.2) should include a transport assessment. Applicants should consult Highways England, Highway authorities, the railway network operator(s), navigation authorities, the Maritime and Coastguard Agency and the Associated British Ports, as appropriate, on the assessment and on mitigation measures. The assessment should distinguish between construction and operation stages if appropriate, although for the geological disposal facility the

construction will continue through most of the operation phase. The assessment should illustrate accessibility to the site by all modes of transport and the likely split by each mode of travel to and from the site. The applicant should prepare a travel plan including any demand management measures to mitigate transport impacts. The applicant should also provide details of proposed measures to improve access by public transport, walking and cycling, to reduce the need for parking associated with the proposal and to mitigate transport impacts.

5.12.4 If additional transport infrastructure is proposed, applicants should discuss with network providers the possibility of other funding arrangements including co-funding by government. Guidance has been issued in respect of England which explains the circumstances where this may be possible. Government cannot guarantee in advance that funding will be available for any given uncommitted scheme at any specified time. An applicant should explain how they consider any such additional transport infrastructure is sufficiently associated with the development for which they are seeking development consent.

5.12.5 The design of the transport package, prior to shipment, must be submitted by the applicant and approved by the Office for Nuclear Regulation before transportation of radioactive waste takes place[156]. This process is separate from, and not a prerequisite to, any grant of development consent. The Examining Authority need not assess the safety of radioactive materials transport.

Decision Making

5.12.6 If a proposed development may cause significant impacts on the surrounding transport infrastructure, the Secretary of State should ensure that the applicant has taken reasonable steps to mitigate these impacts, including during the construction phase of the development. Applicants may also be willing to enter into planning obligations for funding infrastructure and otherwise mitigating adverse impacts.

5.12.7 Requirements can be imposed to mitigate transport impacts identified in the transport assessment (attribution of costs will be calculated in accordance with the Department for Transport's guidance). In this case, development consent should not be withheld, and appropriately limited weight should be applied to residual effects on the surrounding transport infrastructure.

Mitigation

5.12.8 Where mitigation is needed, subject to operational and feasibility issues, demand management measures are preferred before considering and imposing new transport infrastructure to manage transport impacts.

5.12.9 The Secretary of State should also have regard to the cost-effectiveness of demand management measures compared to new transport infrastructure, as well as the aim to secure more sustainable patterns of transport development when considering mitigation measures.

[156] UK legislation implements international agreements on the transport of radioactive materials. The regulations (Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009 (CDG)) specify the required performance standards for transport packages in routine, normal and accident conditions. The Office for Nuclear Regulation regulates the movement of all radioactive material in Great Britain (with the exception of some material related to defence). The regulations define requirements for administrative and operational controls, quality assurance, training, security, emergency arrangements and accident reporting. The Office for Nuclear Regulation monitors all operators to ensure compliance.

5.12.10 Where considerations are between rail, water-borne or road transport, rail and water-borne options are to be preferred over road transport options, where that option is safe (as informed by environmental considerations or the Transport Assessment) and cost-effective.

5.12.11 Where there is likely to be substantial heavy goods vehicle traffic, an applicant should consider how to:

- control numbers of heavy goods vehicle movements to and from the site in a specified period during construction and operation where possible and consider the impacts of alternative transport routes;
- make sufficient provision for heavy goods vehicle parking, either on the site or at dedicated facilities elsewhere, to avoid in normal operating conditions, 'overspill' parking on public roads, prolonged queuing on approach roads and uncontrolled on-street Heavy Goods Vehicle parking; and
- ensure satisfactory arrangements for reasonably foreseeable abnormal disruption, in consultation with relevant network providers and the responsible police force.

5.12.12 The Secretary of State may consider attaching requirements, or requiring obligations in relation to, any development consent to ensure such arrangements are delivered.

5.13 Waste Management

Introduction

5.13.1 The radioactive waste inventory for disposal is comprised of material that has been designated as waste and not intended for reuse, and which is not considered possible to recycle or recover in a safe, secure and economical manner. Specific considerations of radioactive waste are set out in section 1.2 of this NPS and are not considered further here. This section relates to hazardous (but not radioactive) and non-hazardous waste arising as a result of the development of geological disposal infrastructure.

5.13.2 Some geological disposal infrastructure developed for the management of higher activity radioactive waste will itself generate significant amounts of spoil, such as excavated material, during the construction and operational phase.

5.13.3 Government policy on hazardous and non-hazardous waste is intended to protect human health and the environment by seeking to minimise the volume of waste produced and by using it as a resource wherever possible.

5.13.4 Sustainable waste management is implemented through the 'waste hierarchy', which sets out the priorities that must be applied when managing waste[157]. These are (in order):

- prevention;
- preparing for reuse;

[157] The waste hierarchy is set out in Article 16 of Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives and the Waste (England and Wales) Regulations 2011/988.

- recycling;
- other recovery, including energy recovery; and
- disposal.

5.13.5 Disposal of hazardous and non-hazardous waste arising as a result of development of geological disposal infrastructure should only be considered where other waste management options identified above are not available or where it is considered to offer the best overall environmental outcome.

5.13.6 The Environment Agency's environmental permitting regime incorporates operational waste management requirements for certain activities. When an applicant applies to the Environment Agency for an Environmental Permit, the Environment Agency will require the applicant to demonstrate that processes are in place to meet all relevant requirements.

Applicant's Assessment

5.13.7 The applicant should set out the arrangements that are proposed for managing any waste produced during the construction, operation and closure of geological disposal infrastructure that cannot be managed at the facility itself. The applicant should prepare a Site Waste Management Plan. The arrangements in the plan should include information on the proposed waste recovery and disposal system for all waste generated by the development and should also include details of the alternatives that have been considered. The applicant must demonstrate that all waste produced by the facility will be managed in accordance with the waste hierarchy outlined in paragraph 5.13.4 above and that, during construction, excavated soil, subsoil and rock will, where possible, be reused. The applicant should seek to minimise the volume of waste produced. The applicant should also seek to minimise the volume of waste sent for disposal unless it can be demonstrated that this is the best overall environmental outcome.

Decision Making

5.13.8 The Secretary of State should consider the extent to which the applicant has proposed an effective system for managing hazardous and non-hazardous waste arising from the construction, operation and closure of the proposed development. The Secretary of State should be satisfied that:

- any such waste will be properly managed, both on-site and off-site;
- the waste from the proposed development can be dealt with appropriately by the waste infrastructure which is, or is likely to be, available. Such waste arising should not have an adverse effect on the capacity of existing waste management facilities to deal with other wastes in the area;
- adequate steps have been taken to minimise the volume of waste arising, and
- adequate steps have been taken to minimise the volume of waste to be sent for disposal, considering what provides the best overall environmental outcome.

5.13.9 The construction and operation of geological disposal infrastructure is subject to the environmental permitting regime. Waste management arrangements during

construction and operation will be covered by the permitting arrangements. The considerations set out in section 4.7 will apply.

Mitigation

5.13.10 Where necessary, the Secretary of State should use requirements or obligations to ensure that appropriate measures for waste management are applied. The Secretary of State may include a requirement for the review and revision of waste management plans at reasonable intervals during the lifetime, or specific phases, of the development.

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

Introduction

5.14.1 Geological disposal infrastructure could have an adverse effect on the water environment, including groundwater, inland surface water, transitional waters[158] and coastal waters.

5.14.2 The proposed development could lead to increased demand for water, involve discharges to water and cause adverse ecological effects resulting from physical modifications to the water environment (hydromorphological changes). There may also be an increased risk of spills and leaks of pollutants to the water environment. These effects could lead to adverse impacts on health or on protected species and habitats (see section 5.4 on biodiversity and nature conservation), and could, in particular, result in surface waters, groundwater or protected areas[159] failing to meet environmental objectives established under the Water Framework Directive[160] (which has been implemented through the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017). Preventing deterioration in status is the primary environmental objective of the Water Framework Directive.

5.14.3 The government's planning policies make clear that the planning system should contribute to and enhance the natural and local environment. It should do this by preventing both new and existing development from contributing to water pollution so that the environment is not adversely affected or put at unacceptable risk. The government has issued guidance on water supply, wastewater and water quality considerations in the planning system[161]. Where applicable, an application for

[158] See Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (the Water Framework Directive, available online at: http://eur-lex.europa.eu/resource.html?uri=cellar:5c835afb-2ec6-4577-bdf8-756d3d694eeb.0004.02/DOC_1&format=pdf. Transitional waters are bodies of surface water in the vicinity of river mouths which are partly saline in character as a result of their proximity to coastal waters, but which are substantially influenced by freshwater flows.

[159] Protected areas are areas which have been designated as requiring special protection under specific Community legislation for the protection of their surface water and groundwater or for the conservation of habitats and species directly depending on water.

[160] The Water Framework Directive allows for situations where it is not realistically possible to meet its targets. Article 4.7 provides the process whereby an exemption may be granted, including for the purpose of Sustainable Development, where new modifications to a water body would prevent achievement of the WFD's environmental objectives.

[161] www.gov.uk/guidance/water-supply-wastewater-and-water-quality

development consent must contain a plan with accompanying information identifying water bodies in a River Basin Management Plan[162], and providing an assessment meeting the requirements of the Water Framework Directive, which looks to provide an overall net gain by enabling the delivery of the River Basin Management Plan.

Applicant's Assessment

5.14.4 An applicant should make early contact with the relevant regulators, including the local authority and the Environment Agency (including for abstraction licensing), and with utility companies likely to be responsible for supplying the water. Early engagement can help establish if impact on the water environment is likely to be a significant planning concern and, if it is, to clarify what assessment will be needed to support the application. The information supplied should be proportionate to the nature and scale of development proposed and the level of concern about the water environment. Where the proposed development is likely to have adverse effects on the water environment, the applicant should undertake an assessment of the existing status and impacts of the proposed development on both the water environment and the physical characteristics as part of the Environmental Impact Assessment and set this out in the Environmental Statement. Further guidance for the applicant on assessing impacts on the water environment is given in sections 4.2 and 4.7 of this NPS.

5.14.5 Applicants should demonstrate that they have incorporated, where possible, design measures such as:

- independent water storage and collection facilities;
- opportunities for recycling and reuse of water;
- the use of automated leak detection (for non-disposal parts of the facility); and
- building specific metering and rain harvesting.

5.14.6 Any major infrastructure project may require significant amounts of water; the applicant should provide information on the measures they intend to put in place to provide suitable mitigation against the impact on local water resources.

5.14.7 The applicant should state what emergency response procedures should be put in place to deal with any pollution incident quickly and the measures that will be used to avoid any adverse effects from accidental spills of non-radiological liquids (e.g. chemicals).

5.14.8 In the context of protecting groundwater the applicant should in particular take note of the following guidance:

- Groundwater Activities Guidance[163] which explains the legal requirements associated with groundwater activities;

[162] River Basin Management Plans set out how partners work together to protect and improve the water environment. River Basin Management Plans set out for each district, the: state of the water environment; pressures affecting the water environment; objectives for protecting and improving the water environment; actions or measures needed to achieve the objectives.

[163] www.gov.uk/government/publications/environmental-permitting-guidance-groundwater-activities

- supplementary guidance[164] related to the implementation of the Groundwater Directive[165]. This guidance document supplements and updates the guidance on the Groundwater Directive which was provided in the publication 'Guidance on Requirements for Authorisation' for geological disposal facilities (on land)[166].

Decision Making

5.14.9 Activities that discharge substances into the water environment are subject to pollution control. The considerations set out in section 4.7 of this NPS on the interface between planning and pollution control therefore apply. These considerations will also apply in an analogous way to the abstraction licensing regime; this regulates activities that take water from the water environment and to the development works.

5.14.10 The Secretary of State will generally need to give impacts on the water environment more weight where a development would have adverse effects on the achievement of the environmental objectives established under the Water Framework Directive.

5.14.11 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[167] (including Article 4.7) and its daughter directives[168], including those on priority substances and groundwater. The specific objectives for particular river basins are set out in River Basin Management Plans.

5.14.12 The Secretary of State should consider proposals to mitigate adverse effects on the water environment put forward by the applicant and whether appropriate requirements should be attached to any development consent and/or whether planning obligations are necessary.

Mitigation

5.14.13 Mitigation should be practicable and proportionate to the likely impact. The impact on local water resources can be minimised through planning and design for the efficient use of water, including water recycling.

5.14.14 The Secretary of State should consider whether the mitigation measures put forward by the applicant, where needed for the construction and operation of the geological disposal infrastructure, are acceptable.

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[164] www.gov.uk/government/uploads/system/uploads/attachment_data/file/296508/LIT_8036_58590a.pdf

[165] Directive 2006/118/EEC of the European Parliament and of the Council on the protection of groundwater against pollution and deterioration. Aspects of this Directive have been implemented through the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 and the Groundwater (Water Framework Directive) (England) Direction 2016.

[166] Geological Disposal Facilities on Land for Solid Radioactive Wastes, Guidance for requirements of Authorisation, Environment Agency, 2009, available online at: http://bit.ly/1STsINa

[167] The Water Framework Directive allows for situations where it is not realistically possible to meet its targets. Article 4.7 provides the process whereby an exemption may be granted, including for the purpose of Sustainable Development, where new modifications to a water body would prevent achievement of the WFD's environmental objectives. Article 4.7 has been implemented through regulation 19 of the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017.

[168] There are single Directives (sometimes referred to as 'daughter directives') that set out the principles and instruments of a Framework Directive with regards to specific issues. In the case of the Water Framework Directive, the daughter directives include the Groundwater Directive (2006/118/EC) and the Environmental Quality Standards Directive (2008/105/EC), addressing water pollution by toxic substances and diffuse pollution from industry, agriculture and surface water run-off.

5.14.15 The risk of impacts on the water environment can be reduced through careful design to facilitate adherence to good pollution control practice. For example, designated areas for storage and unloading, with appropriate drainage facilities, should be marked clearly.

Glossary

Air Quality Management Area
An area designated under the Environment Act 1995 which is not meeting the national air quality objectives defined by the UK Air Quality Regulations 2010.

Appraisal of Sustainability
An appraisal of the sustainability of the policy set out in a National Policy Statement, as required by Section 5(3) of the Planning Act 2008.

Area of Outstanding Natural Beauty
An area in England or Wales designated under the Countryside and Rights of Way Act 2000 or an area in Northern Ireland designated under the Nature Conservation and Amenity Lands (Northern Ireland) Order 1985, to conserve and enhance its outstanding natural beauty. The conservation of the natural beauty of an area includes a reference to the conservation of its flora, fauna and geological and physiographical features.

Barrier
A physical or chemical means of preventing or inhibiting the movement of radionuclides.

Biosphere
That part of the environment normally inhabited by living organisms. In practice, the biosphere is generally taken to include the atmosphere and the Earth's surface, including the soil and surface water bodies, seas and oceans and their sediments. There is no generally accepted definition of the depth below the surface at which soil or sediment ceases to be part of the biosphere, but this might typically be taken to be the depth affected by basic human actions, in particular farming.

Borehole
A borehole is the generalised term for any cylindrical excavation into the ground made by a drilling device for purposes such as site investigation, testing and monitoring. Deep borehole investigations are necessary to characterise and assess potential sites and will be an integral part of the process for developing a geological disposal facility.

Characterisation programme
When a potential site is identified, a programme of focussed geological investigations will take place. This will include a number of deep borehole investigations and will aim to characterise the subsurface to such a degree that the developer is confident a safety case can be made for a geological disposal facility

Closure
The administrative and technical actions that have to be taken to put a disposal facility in its intended final state after the completion of waste placement. 'Closure' refers to the process of permanently closing the facility, by backfilling and sealing any disposal areas (unless already completed during the operational period); backfilling and sealing of access tunnels, shafts and boreholes; removal and decommissioning of surface buildings and installations and site restoration; and potentially institutional control.

Committee on Radioactive Waste Management (CoRWM)
The Committee on Radioactive Waste Management provide independent scrutiny and advice to the government on the long term management of higher activity radioactive waste. They are an advisory non-departmental public body, sponsored by the Department for Business, Energy and Industrial Strategy (BEIS).

Cumulative effects
Effects which combine from at least two sources to act on a common receptor. The total effect may be greater or less than the sum of the individual effects.

Decommissioning
The process whereby a nuclear facility, at the end of its economic life, is taken permanently out of service and its site made available for other purposes.

Development Consent Order
The planning consent given by the Secretary of State for a nationally significant infrastructure project.

Devolved administrations
Collective term for the Scottish Government, the Welsh Government and, in Northern Ireland Executive.

Disposal
In the context of solid waste, disposal is the emplacement of waste in a suitable facility without intent to retrieve it at a later date.

Drift
A sloping, underground tunnel.

Environment Agency
The environmental regulator for England. The Environment Agency's role is the implementation of legislation aimed at protecting the environment, in the context of sustainable development. In relation to a geological disposal facility the Agency's main role is authorising and controlling radioactive discharges and waste disposal to air, water and land. The Environment Agency also regulates nuclear sites as well as other radioactive waste disposal sites under the Environmental Permitting Regulations and issues consents for non-radioactive discharges.

Environmental Impact Assessment
A legal requirement under EU Directive 2011/92/EU (as amended) for certain types of project, including various categories of radioactive waste management project. It requires information on the environmental impacts of a project proposal to be submitted by the developer and evaluated by the relevant competent authority.

Environmental Permit
Permission granted by the environmental regulator in England to allow an operator to carry out certain activities, subject to conditions and limits on discharges to the environment.

Environmental Permitting (England and Wales) Regulations 2016
These regulations provide a consolidated system of permitting regime for waste facilities in England and Wales, including the disposal of radioactive waste.

Environmental safety
The safety of people and the environment both at the time of disposal and in the future.

Environmental safety case
The collection of arguments, provided by the developer or operator of a disposal facility, that seeks to demonstrate that the required standard of environmental safety is achieved.

Environmental Statement
This is a publicly available document which sets out the developer's own assessment of the likely environmental effects of the proposed development.

Habitat site
This has the same meaning as 'European Site', which includes candidate Special Areas of Conservation (cSACs), Sites of Community Importance (SCIs), Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) and is defined in regulation 8 of the Conservation of Habitats and Species Regulations 2017.

Geological disposal
A long term management option involving the emplacement of radioactive waste in an engineered underground geological disposal facility or repository, where the geology (rock structure) provides a barrier against the escape of radioactivity and there is no intention to retrieve the waste once the facility is closed.

Geological disposal facility
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.

Geological disposal infrastructure
Geological disposal infrastructure includes:

- any deep geological facility for disposing of the waste - geological disposal facilities. A geological disposal facility is expected to be constructed at a depth of at least 200 metres beneath the surface of the ground or seabed:
- the deep investigatory boreholes necessary to characterise the geology at a particular site to enable its suitability as a site for a geological disposal facility to be considered. The boreholes are expected to be constructed to a depth of at least 150 metres beneath the surface of the ground or seabed.

Habitats Regulations Assessment
A report to support the Secretary of State in making planning decisions in compliance with the Conservation of Habitats and Species Regulations 2017 (the Habitats Regulations).

Health and Safety Executive
A statutory body whose role is the enforcement of work-related health and safety law. Nuclear regulation and regulation of conventional health and safety on nuclear sites is carried out by the Office for Nuclear Regulation.

Higher activity radioactive waste
Includes the following categories of radioactive waste: high level waste, intermediate level waste, a small fraction of low level waste with a concentration of specific radionuclides sufficient to prevent its disposal as low level waste.

High level waste
Radioactive waste that generates heat as a result of its radioactivity, so this factor has to be taken into account in the design of storage or disposal facilities.

Intermediate level waste
Radioactive waste exceeding the upper activity boundaries for low level waste, but which does not need heat to be taken into account in the design of storage or disposal facilities.

Legacy waste
Radioactive waste which already exists or will be produced in the future by the operation of an existing nuclear power plant.

Low level waste
Radioactive waste not exceeding specified levels of radioactivity. Overall, the major components of low level waste are building rubble, soil and steel items from the dismantling and demolition of nuclear reactors and other nuclear facilities and the clean-up of nuclear sites.

National Policy Statement
A statement that provides guidance to the Planning Inspectorate and Secretary of State on assessing and making a decision on development consent applications for a particular type of infrastructure.

Nationally significant infrastructure project
A project of a type and scale in England defined under the Planning Act 2008 relating to energy, transport, water, waste water and waste generally.

Natura 2000
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 and Special Protection Areas designated respectively under the Habitats Directive and Birds Directive. The network includes both terrestrial and marine sites (Marine Protected Areas).

Natural Resources Wales
The environmental regulator in Wales. Natural Resources Wales 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. Regulation of business and industry are amongst its statutory responsibilities. This 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.

Nuclear Decommissioning Authority (NDA)
A non-departmental public body created through the Energy Act 2004. The Nuclear Decommissioning Authority is a strategic authority that owns 19 UK sites and the associated civil nuclear liabilities and assets of the public sector. It reports to the Department for Business,

Energy and Industrial Strategy (BEIS); for some aspects of its functions in Scotland, it is responsible to Scottish Ministers.

Nuclear Safeguards
Nuclear safeguards are measures to verify that countries comply with their international obligations not to divert nuclear materials from their civil nuclear programmes into military or weapons programmes. These measures comprise requirements placed on nuclear operators and inspections and other measures to assess compliance and enforce those requirements.

Office for Nuclear Regulation (ONR)
The Office for Nuclear Regulation independently regulates nuclear safety and security at 37 nuclear licensed sites in Great Britain. It also regulates the transport of radioactive materials and monitors safeguards performance in the UK, supporting the international inspectorates to ensure that the UK's safeguards obligations are met in a proportionate manner. The Office for Nuclear Regulation operates a goal-setting regime setting out its regulatory expectations and requiring licensees to determine and justify how best to achieve them. The Office for Nuclear Regulation has 36 conditions attached to each nuclear site licence within which the licensees are expected to operate. A combination of the Office for Nuclear Regulation's assessment and inspection functions allow the Office for Nuclear Regulation to judge whether licensees are meeting their legal obligations.

Operational lifetime
This refers to the period of construction (including pre-construction works) and operation of the facility (or boreholes), up to and including closure.

Planning Act 2008
Planning legislation in England and Wales for nationally significant infrastructure projects, under which applications are made to the Planning Inspectorate and then the decision made by the relevant Secretary of State. This is separate to the Town and Country Planning Act 1990, under which planning applications for other forms of development are made to the local authority.

Post-closure
The period after the closure, once the facility has been sealed and the waste successfully disposed of, is referred to as post-closure.

Radioactive waste
Any material contaminated by or incorporating radioactivity above certain thresholds defined in legislation, and for which no further use is envisaged, is known as radioactive waste.

Radioactive Waste Management Limited (RWM)
A wholly owned subsidiary of the Nuclear Decommissioning Authority, a non-departmental public body. It is responsible for implementing a safe, sustainable, publicly acceptable geological disposal programme (the developer).

Radioactivity
Atoms undergoing spontaneous random disintegration, usually accompanied by the emission of radiation.

Ramsar sites

Ramsar sites are wetlands of international importance, designated under the Ramsar Convention.

Reprocessing
A physical or chemical separation operation, the purpose of which is to extract uranium or plutonium for re-use from spent fuel.

Safety case
A set of documents that describe arguments and evidence in support of the safety of a facility or activity. This will normally include the findings of a safety assessment and a statement of confidence in these findings. For a geological disposal facility, there will be a number of safety cases required covering nuclear safety, environmental safety, and transport safety. A safety case may also relate to a given stage of development (e.g. site investigations, commissioning, operations, closure, post-closure, etc.).

Site licence
A nuclear site licence is a legal document granted by the Office for Nuclear Regulation. It contains site-specific information and defines the number and type of installations permitted.

Site of Special Scientific Interest
Designated under the Wildlife and Countryside Act 1981, any land in England or Wales considered by Natural England or Natural Resources Wales to be of special interest because of any of its flora, fauna, or geological and physiographical features.

Special Area of Conservation (SAC)
Special Areas of Conservation are strictly protected sites designated under the Habitats Directive.

Special Protected Area (SPA)
Special Protected Areas are strictly protected sites classified in accordance with Article 4 of the Birds Directive.

Spent fuel
Nuclear fuel removed from a reactor following irradiation that is no longer usable in its present form because of depletion of fissile material, poison build-up or radiation damage.

Storage
The emplacement of waste in a suitable facility with the intent to retrieve it at a later date.

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 Directive (Directive 2001/42/EC) and UK Strategic Environmental Assessment Regulations (SI 2004/1633, SI 2004/1656, SR 2004/280).

Sustainable drainage system (SuDS)
A drainage system designed to minimise the environmental risks resulting from surface water run-off from developments and to contribute wherever possible to environmental enhancement.

Annex A – Staged regulation of safety and security of geological disposal infrastructure

Table showing staged regulation by the Environment Agency and Office for Nuclear Regulation, and their involvement in the DCO process. Note the Environment Agency is also responsible for regulating other environmental aspects associated with geological disposal infrastructure development.

Site development stage	Planning Inspectorate & Secretary of State Development Consent Order	Environment Agency (EA) Environmental Permitting	Office for Nuclear Regulation (ONR) Nuclear Site Licence	Interface of regulators with planning process
Deep borehole investigation	Under the Planning Act 2008, development consent is needed for development where: (a) the borehole is expected to be constructed to a depth of at least 150 metres beneath the surface of the ground or seabed, and (b) the main purpose of constructing the borehole is to obtain information, data or samples to determine the suitability of a site for the construction or use of a radioactive waste geological disposal facility.	Under the Environmental Permitting Regulations 2016, an environmental permit is required for: “intrusive investigation work”, which means “the drilling of boreholes into, or excavation of, sub-soil or rock to determine geological or hydrogeological conditions”. Before granting an environmental permit, the EA will need to be satisfied that the proposed deep boreholes will not have a detrimental effect on the long-term safety of a geological disposal facility developed at a potential site. The developer will need to provide an initial site evaluation that demonstrates this.	Any health and safety related issue for deep boreholes will be regulated by the Health and Safety Executive. There is no intent to license the surface investigations phase.	The EA will be consulted on the Environmental Statement(s) and Habitats Regulations Assessment(s) required to support development consent applications for deep boreholes, and for each subsequent stage in developing a geological disposal facility that requires development consent.

Site development stage	Planning Inspectorate & Secretary of State Development Consent Order	Environment Agency (EA) Environmental Permitting	Office for Nuclear Regulation (ONR) Nuclear Site Licence	Interface of regulators with planning process
Underground investigation – outside of the deep borehole investigations, any investigations that are undertaken during the excavation which would ultimately be the site for a geological disposal facility	Under the Planning Act 2008, development consent is needed for development where: (a) the main purpose of the facility is expected to be the final disposal of radioactive waste, (b) 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 (c) 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.	The EA would expect the developer to demonstrate that underground operations will not have a detrimental effect on the long-term environmental safety at the site. This demonstration could include aspects such as geology, hydrogeology and other characteristics of the site. The developer will need to submit a preliminary environmental safety evaluation that demonstrates this.	There are clear safety implications for the operational phase of a geological disposal facility if the underground investigations and excavations are inadequately conceived or executed. Therefore, at this stage, the developer will need to obtain a nuclear site licence from the ONR before starting any excavation work that may have safety significance, such as constructing an access shaft or drift. The developer will need to submit to the ONR a pre-construction safety report for the geological disposal facility addressing safety and where appropriate security considerations.	The EA will be consulted on the Environmental Statement(s) and Habitats Regulations Assessment(s) required to support development consent applications for the development of a geological disposal facility. The ONR will advise the Examining Authority/Secretary of State on operational safety, security and transport matters with regards to the development consent order application for a geological disposal facility.

Site development stage	Planning Inspectorate & Secretary of State Development Consent Order	Environment Agency (EA) Environmental Permitting	Office for Nuclear Regulation (ONR) Nuclear Site Licence	Interface of regulators with planning process
Building the infrastructure for the disposal facility	n/a	At this stage, the EA will require detailed evidence to be submitted demonstrating that a geological disposal facility at the site could meet its regulatory requirements for disposing of radioactive waste. If the developer's proposals meet regulatory requirements, the EA will grant a revised environmental permit. The evidence submitted should also help the EA to decide, in principle, if it could eventually grant an environmental permit for disposing of radioactive waste. The developer will submit an initial environmental safety case to demonstrate this.	The ONR will regulate construction to ensure that the design intent is delivered. The developer will need to submit further pre-construction safety reports and a pre-commissioning safety report to demonstrate this.	The developer will need to comply with any Protective Provisions, Deemed Marine Licence or requirements within the Development Consent Order – these may involve input from the EA or ONR.

Site development stage	Planning Inspectorate & Secretary of State Development Consent Order	Environment Agency (EA) Environmental Permitting	Office for Nuclear Regulation (ONR) Nuclear Site Licence	Interface of regulators with planning process
Operating the facility – disposing of radioactive waste	n/a	Before disposal of radioactive waste commences an appropriate environmental permit will be needed. The operator of the geological disposal facility will need to develop its safety justification and provide evidence that after the facility has closed, people and the environment will be protected in the long term. This evidence may include information and data obtained in previous development phases, from research, development and demonstration studies, and from experience in other countries. The developer will submit a pre-operational environmental safety case to demonstrate this. The operational phase of the geological disposal facility is likely to last 150 years or more, and there is a requirement for the operator to periodically review its environmental safety performance and submit reports of these reviews to the EA to demonstrate that the geological disposal facility continues to meet regulatory requirements. The EA will periodically review the updated evidence and decide whether any regulatory action is needed to ensure a continuing high standard of protection of people and the environment.	Before disposal of radioactive waste commences permission under the nuclear site licence will be needed. The operator of the geological disposal facility will need to develop its safety justification and provide evidence that the facility operations are safe and secure. This evidence may include information and data obtained in previous development phases, from research, development and demonstration studies, and from experience in other countries. To decide whether there is an acceptable level of safety and security, the ONR will consider the developers pre-operational safety report. The operational phase of the geological disposal facility is likely to last 150 years or more, and there is a requirement for the operator to periodically review its safety and security performance and submit reports of these reviews to the ONR to demonstrate that the geological disposal facility continues to meet regulatory requirements. The ONR will review the updated evidence and decide whether any regulatory action is needed to ensure a continuing high standard of protection.	The developer will need to comply with any Protective Provisions, Deemed Marine Licence or requirements within the Development Consent Order – these may involve input from the EA or ONR.

Site development stage	Planning Inspectorate & Secretary of State Development Consent Order	Environment Agency (EA) Environmental Permitting	Office for Nuclear Regulation (ONR) Nuclear Site Licence	Interface of regulators with planning process
Closing the facility	n/a	The EA would expect the operator to include fully developed plans for closing and sealing the disposal facility as part of its evidence to support its application for closure. The closed facility would be expected to meet the regulatory requirements current at the time of closure for protecting people and the environment in the long term. The developer will be required to submit a post-operational environmental safety case to demonstrate this. The regulatory process is likely to continue after the facility has closed, ending only when the EA accepts that the operator no longer needs to hold an environmental permit.	The ONR would expect the operator to include fully developed plans for closing and sealing the disposal facility as part of its evidence to support its application for closure. The developer will be required to submit a pre-closure safety report to demonstrate this. The operator will need to demonstrate that the facility has been closed and sealed in accordance with the conditions of the nuclear site licence. The ONR expects that once a geological disposal facility has closed there will no longer be an operational risk to safety that would need regulating under a nuclear site licence.	The developer will need to comply with any Protective Provisions, Deemed Marine Licence or requirements within the Development Consent Order – these may involve input from the EA or ONR.

This publication is available from: www.gov.uk/government/publications/national-policy-statement-for-geological-disposal-infrastructure

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