DEPARTMENT OF ENERGY & CLIMATE CHANGE

National Policy Statement for Nuclear Power Generation (EN-6)

Volume II of II - Annexes

Planning for new energy infrastructure **July 2011**

Department of Energy and Climate Change

National Policy Statement for Nuclear Power Generation (EN-6)

Volume II of II – Annexes

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VOLUME II

ANNEX A: Imperative Reasons of Overriding Public Interest

A.1 Examination of Imperative Reasons of Overriding Public Interest

A.1.1 The Nuclear NPS is a plan for the purposes of the Habitats Directive and has been subjected to a Habitats Regulations Assessment including Appropriate Assessment.

A.1.2 The strategic level Appropriate Assessment concluded that the potential for adverse effects on the integrity of European Sites, either from the plan alone, or in combination with other plans, could not be ruled out. The assessment proposed avoidance and mitigation measures but, in the absence of project level detail, it has not been able to conclude beyond reasonable scientific doubt that the potential adverse effects on the integrity of the European Sites will be effectively avoided or mitigated.

A.1.3 In line with the requirements of the Habitats Directive, the assessment went on to consider whether there were alternative solutions to delivering the requirements of the plan that would better respect the integrity of the European Sites considered in the Habitats Regulations Assessment process. The Government here outlines the Imperative Reasons of Overriding Public Interest (IROPI) that require that the NPS is designated, which includes the assessment of alternatives detailed in paragraph 1.1.6. of this NPS.

A.1.4 As it is not possible at the strategic level of the Habitats Regulations Assessment to rule out potential adverse effects on the integrity of European Sites which host priority features, it is necessary to comply with the requirements of Article 6(4) of the Habitats Directive. The IROPI which justify the plan relate to:

- the protection of human health;
- public safety; and
- overriding beneficial consequences of primary importance for the environment.

A.1.5 Because the IROPI only relate to these considerations, it is not necessary to seek the opinion of the European Commission in relation to the IROPI case.

A.1.6 Consistent with European Commission guidance[1] that before IROPI can be demonstrated it is necessary to analyse and demonstrate the need for the plan, the alternative of not having the plan and alternatives ways of meeting the plan, the Government considered:

- why new generating capacity is needed;
- why there is a need for nuclear power as part of the generating mix;
- why it is necessary for the sites assessed as potentially suitable to be listed in the draft Nuclear NPS and why not sites at different locations; and
- why this Nuclear NPS is needed.

A.2 Why new generating capacity is needed

A.2.1 Energy underpins almost every aspect of our way of life. It enables us to heat and light our homes; to produce and transport food; to travel to work, around the country and the world. Our businesses and jobs rely on the use of energy. And energy is essential for the critical services we rely on – from hospitals to traffic lights and cash machines. It is difficult to overestimate the extent to which our quality of life is dependent on adequate energy supplies.

A.2.2 Part 2 of EN-1 explains the two key policy goals that drive the need for new electricity generation. The first is the need to decarbonise the economy. The second is that it is critical that the UK continues to have secure and reliable supplies of electricity as we make the transition to a low carbon economy. To do this, we need sufficient capacity to meet demand at all times (including a sufficient capacity margin). We also need a diverse mix of technologies and fuels, so that we do not rely on any one technology or fuel.

A.2.3 To meet the Government's objective to maintain or enhance levels of energy security, and because as explained above electricity is an essential component of any modern society, there is a need to replace capacity as well as to meet expected increases in demand for electricity generation. The option of not doing so is not tenable because of the harmful impacts on human health and public safety as a result of interruptions to electricity supply. As set out in Part 3 of EN-1, a significant amount of existing generating capacity (about 22GW) is due to close by 2025 either because it

[1] European Commission, Guidance Document on Article 6(4) of the Habitats Directive, Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, Opinion of the Commission, January 2007, paragraph 1.3.1.

does not meet European emission standards or because power stations are coming to the end of their natural operating lives.

A.2.4 The UK is committed to reducing greenhouse gas emissions by at least 80% by 2050, relative to 1990 levels. The Committee on Climate Change has stated that in order to achieve this target there is a need for the supply of electricity to be almost entirely decarbonised by 2050[2]. This is a very significant undertaking and it is therefore essential that no form of low carbon generation (for example, renewables, fossil fuels with carbon capture and storage (CCS) and nuclear power) is ruled out. EN-1 sets out the need for renewables, nuclear and fossil fuels with CCS.

A.2.5 EN-1 considers in detail the possible alternatives to adding new generation capacity: demand reduction; more intelligent use of electricity; and the increased interconnection of electricity systems. The Government believes that although increased energy efficiency, smart demand management and opportunities for increased storage and interconnection are being actively pursued and are important, their effect on the need for new large scale energy infrastructure will be limited due to an increased need for electricity for domestic and industrial heating and transport[3]. Strategies to reduce demand and improve energy efficiency are therefore complementary to, rather than an alternative to, new generating capacity.

A.2.6 The Government has considered the likely scale of the need for new capacity that could be required by 2025. The Updated Energy and Emissions Projections show that, assuming that demand for electricity in 2025 is at similar levels to today, in one scenario around 59GW of new capacity will be required by the end of 2025[4].

A.2.7 The UEP scenarios all assume that electricity demand in 2025 will be at approximately the same levels as it is today. Whilst increased energy efficiency measures and the impact of the recent recession mean that some industry models support this assumption[5] it is quite possible that any of these scenarios may underestimate the increased use of electricity by 2025 as the UK moves to decarbonise. This means that the amount of new

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2 The 2050 target is enshrined in the Climate Change Act 2008. The Committee on Climate Change has said that the UK will need to decarbonise the electricity system by 75% by 2030 to meet the 2050 target.

3 Part 3 of EN-1

4 DECC, *Updated Energy and Emissions Projections*, 2010. The scenario used is the high fossil fuel and carbon prices scenario. It should be noted that there is a significant amount of uncertainty in forecasting future demand and capacity. EN-1 sets out that Government considers it appropriate to consider the high scenario because it is prudent to plan for the greatest potential need for new electricity generating infrastructure. To do otherwise would create an unacceptable risk to the delivery of secure, affordable low carbon energy supplies.

5 National Grid projections (published in April 2010) suggest in some scenarios that electricity demand may remain at today's levels by 2025.

capacity shown in the scenarios (including the high scenario considered below) may be too low.

A.2.8 The NPS has focused upon 2025 because of the importance of listing sites which can come on stream in good time to contribute to the Government's objectives on climate change and energy security. However, in relation to consents that may be given to sites that could be deployed before the end of 2025, the Government also has to look beyond the demand in 2025, in the context of how the UK will move to a secure low carbon economy by 2050. This is because new energy infrastructure which is consented in the next 10 to 15 years will still be generating electricity for 30 to 60 years and therefore has long term implications for energy security and carbon reduction. Paragraphs A.2.9 to A.2.12 examine below the need to 2050 for this purpose.

A.2.9 Beyond 2025 the increased use of electricity as a way of decarbonising the economy is likely to increase the demand for electricity. The Government's 2050 Pathways Analysis considers different scenarios by which the UK can move to a secure low carbon economy by 2050[6]. Whilst there are different pathways by which the UK can reach its 2050 objectives, common themes from the different pathways have emerged which show that:

- ambitious per capita demand reduction is needed and the greater the constraints on low carbon energy supply, the greater the reduction in demand will need to be;
- a substantial level of electrification of heating, transport and industry will be required;
- electricity demand could double by 2050 from present levels and;
- electricity supply will need to be decarbonised.

A.2.10 The 2050 Pathways Analysis shows that reductions in electricity consumption resulting in improvements from energy efficiency will be far outweighed by increases in electricity demand, potentially leading to a doubling of electricity demand between now and 2050. If electricity demand were to double, generation capacity would also need to double if it was supplied by fossil fuels with CCS and nuclear. If one third of the electricity were to be supplied by renewables, generation capacity would need to triple because more capacity would be needed to account for the intermittency of renewables.

A.2.11 The Government considers it prudent to plan on the basis that:

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6 The 2050 Pathways Analysis was published as part of a call for evidence in July 2010: http://econsultation.decc.gov.uk/decc-executive/2050_pathways/consult_view

- a minimum of 59GW of new generating capacity could be required by 2025;
- electricity demand could in fact double by 2050 meaning that capacity could also need to double;
- electricity supply needs to be decarbonised and in doing so we need to retain security of our supplies; and
- investment decisions made in the short term on electricity generating infrastructure will have long term consequences.

A.2.12 The Government has considered its objectives of ensuring security of supply whilst combating climate change, in the face of increased demand and capacity needing to be replaced. It has considered the alternatives of relying on energy efficiency measures, the likely demand for new capacity by 2025 and the themes from the 2050 Pathways Analysis which show that, in the longer term, demand for electricity could double by 2050 and that electricity supply needs to be decarbonised. Having considered the alternatives, there are IROPI in allowing for the provision of new generation capacity because security of electricity supply is essential for the maintenance of human health and public safety and because combating climate change (which is one of the factors creating the demand for new generating capacity) will have beneficial consequences of primary importance for the environment.

A.3 Why there is a need for nuclear power as part of the generating mix

A.3.1 For the UK to meet its energy and climate change objectives, the Government believes that there is an urgent need for new generation plant including new nuclear power. Nuclear power generation is a low carbon, proven technology, which is anticipated to play an increasingly important role as we move to diversify and decarbonise our sources of electricity.

A.3.2 A large proportion of the new generation capacity that is needed by 2025 and in the longer term will be met by renewable generation. However, there is still a need for new conventional thermal generation. For example in the Updated Energy and Emissions Projections scenario, cited above, suggests that of the 59GW of new capacity which will be needed by 2025, around 33GW will need to come from renewable sources to meet the 2020 15% EU renewable target[7]. The remaining 26GW[8] would be met by

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7 Projections from Redpoint analysis indicate that 30% of electricity generation will need to be renewable to meet the 2020 target.

8 There is currently 8GW out of this 26GW already under construction. See Part 3 of EN-1.

conventional thermal generation (in the projections this includes nuclear power).

A.3.3 The UK needs additional conventional thermal generation because renewables are not capable on their own of meeting our future needs for electricity generation. This is because of the UK's need for a diverse energy mix in order to achieve security of supply and also because of their inherent intermittency. The characteristics of nuclear power, explained in detail in EN-1, are very different from those of conventional fossil fuel or renewable generation[9], and the presence of nuclear in the energy mix will be important for security of supply. New nuclear stations are important in this respect as the existing stations will reach the end of their lives towards 2020. Therefore renewables are not a realistic alternative to conventional thermal generation even when combined with energy efficiency and demand reduction.

A.3.4 In order to secure energy supplies that enable us to meet our targets for 2050 and beyond, there is an urgent need for new low carbon electricity capacity to be brought forward as soon as possible, and certainly in the next 10 to 15 years, given the crucial role of electricity as the UK decarbonises its power sector.

A.3.5 Nuclear generation is low carbon[10]. The only other conventional thermal generating technology that has the potential to be low-carbon is fossil fuels with CCS.

A.3.6 However, the complete chain of CCS has yet to be demonstrated at a commercial scale on a power station and there is uncertainty about the future deployment of CCS in the economy. As set out in Part 3 of EN-1, the expectation is that any new coal fired power stations constructed after 2020 will install CCS for the entire power station at the outset, and that previously consented power stations will fully retrofit by 2025. Having said this, the impact of CCS on the economics of power station operation is as yet uncertain. We therefore cannot at this stage rely on CCS as an alternative to nuclear to provide low carbon electricity to meet the UK's needs. Nuclear is the only non-renewable low carbon technology that is currently proven and can be deployed on a large scale[11]. In any event the need for diversity of sources and the difficulty of the task of decarbonisation suggests that we need both nuclear and CCS.

A.3.7 There are IROPI in providing new nuclear generating capacity in order to provide our future energy security in a way which minimises carbon

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9 DTI, The Future of Nuclear Power - the role of Nuclear Power in a Low Carbon Economy, Consultation Document, May 2007, p14, p55.

10 See Part 3 of EN-1

11 18% of the UK's current electricity supply comes from our existing nuclear power stations.

emissions, thus securing public safety, public health and combating climate change, which is a beneficial consequence of primary importance to the environment.

A.4 Why it is necessary for the sites assessed as potentially suitable to be listed in the Nuclear NPS and why not sites at different locations

A.4.1 To contribute to the delivery of the Government's objectives of energy security and decarbonisation the Government believes that, in principle, nuclear should be free to contribute as much as possible towards meeting the future need for non-renewable capacity, up to the end of 2025 and beyond[12]. To ensure that the NPS does not act as a restraint on the ability of energy companies to provide this capacity from nuclear power, it is essential that the NPS contains sufficient sites to allow nuclear to contribute as much as possible towards meeting the need for new non-renewable capacity.

A.4.2 The locations listed in the Nuclear NPS are locations that have been assessed against a range of criteria developed by the Government through extensive consultation with the public, statutory consultees and energy companies and have been identified as being potentially suitable for the deployment of new nuclear power stations by the end of 2025.

A.4.3 The Government does not believe that there are any alternative sites. Three of the sites (Braystones, Kirksanton and Dungeness) which were nominated were not found to be potentially suitable and are thus not considered feasible alternatives. Two of these three sites (Braystones and Kirksanton) were found to be not suitable against criterion D8 (Areas of amenity, cultural heritage and landscape value) and were also not credible for deployment by the end of 2025, although they were found to be no better or worse than the eight potentially suitable sites in terms of potential adverse effects on European Sites. The final site (Dungeness) failed on the grounds of the particular adverse effects to European Sites that the Habitats Regulations Assessment found would flow from its development[13].

A.4.4 The Government also commissioned a study to identify whether there might be any sites, other than those nominated through the SSA process, which are potentially suitable for the deployment of new nuclear power stations by the end of 2025 and which better respect the integrity of European Sites. The study screened the whole of England and Wales using sophisticated modelling techniques and a methodology very similar

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12 See Part 3 of EN-1

13 For further information, see the Habitats Regulations Assessment site report for Dungeness and the Government Response to the consultation at www.energynpsconsultation.decc.gov.uk

to the SSA criteria used to assess nominated sites. The study revealed three sites as worthy of further consideration, but the Government determined that they were not potentially suitable because they were not credible for deployment by the end of 2025 and thus could not meet the objectives of the NPS[14].

A.4.5 There can be no certainty that development consent on all of the sites listed in the NPS will be granted as issues may emerge once they are analysed by the IPC, there is therefore a need to provide sufficient sites to allow sufficient flexibility for developers to meet the urgent need for new nuclear power stations, whilst enabling the IPC to refuse consent should it consider it appropriate to do so.

A.4.6 The Government has therefore concluded that in relation to the designation of the NPS, the eight sites are not alternatives to each other and it is necessary to include all of the eight sites that were found to be potentially suitable by the SSA in the NPS to ensure that sufficient sites are available[15].

A.4.7 Enabling the IPC (where it considers it appropriate) to permit the development of nuclear power stations on any or all of the eight sites is considered necessary to achieve our objective of ensuring security of electricity supply while minimising carbon emissions. Alternatives to new electricity generation, to thermal energy generation, to nuclear power, and to the sites listed in the NPS have been considered. It has been demonstrated that none of these alternatives can be relied on to meet the objective of the plan within the necessary timescales. There are IROPI for including all of the potentially suitable sites in the NPS. Doing this will contribute to the maintenance of human health, and public safety and has beneficial consequences of primary importance for the environment.

A.5 Why this Nuclear NPS is needed

A.5.1 The Nuclear NPS enables the delivery of one of the key principles of the new planning system for nationally significant infrastructure projects pursuant to the Planning Act 2008[16]; namely that the IPC (or its successor)

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14 Prior to finally determining that the three sites were not alternative solutions, the Government carried out a Habitats Regulations Assessment on each of the three sites in an identical manner to those sites nominated through the SSA process. The Government found that potential adverse effects could not be ruled out at a strategic level and they were therefore no better or worse than the nominated sites in relation to their potential effects on European Sites.

15 In the illustrative Updated Energy and Emissions Projections scenario cited above and in EN-1, there is a balance of 18GW to come from new non-renewable capacity. Although it is not possible to predict whether or not there will be more than one reactor at each of the eight sites included in the NPS, a single reactor at each of the sites would result in around 10GW to 14GW of nuclear capacity, depending upon the reactor technology chosen.

16 The Planning Act 2008

should consider urgently needed infrastructure in a timely fashion and decisions should be taken without delay. The national need for the infrastructure has been established by Government (as set out in EN-1). When the IPC considers an individual application it should therefore act on the basis that the need for such development has been demonstrated and should be given substantial weight. The Nuclear NPS together with EN-1 sets out the policy that the IPC should act in accordance with when considering applications for new nuclear development. Without having to consider the detail of the need case, the IPC will be able to focus on the impacts of the development, taking into account the views of local people and local authorities and relevant environmental and regulatory assessments.

A.5.2 Setting out planning policy (including a strong expression of the need for new energy infrastructure and a list of potentially suitable sites) in the Nuclear NPS will result in a more streamlined planning system with enhanced certainty for developers. Continuing delays in the planning process would add to uncertainty for energy companies and could result in them choosing to invest in other generation technologies or in other countries. This would make it more difficult for the UK Government to meet its energy policy objectives of urgently tackling climate change, ensuring security of supply, supporting vulnerable consumers and decarbonising the economy.

A.5.3 The Government has considered alternative approaches to the development of the Nuclear NPS and concluded that the potential for likely significant effects on European Sites would be best managed by a Nuclear NPS with siting criteria and a list of potentially suitable sites[17].

A.5.4 In the light of the Government's objective of having an NPS setting out the need for nuclear power and a list of potentially suitable sites, and having considered that the alternative of not having one would be likely to cause delay and uncertainty in the planning system, there are IROPI for a Nuclear NPS which makes sufficient sites available for development, in order to allow energy companies to generate as much electricity as possible from nuclear power on them.

A.6 Imperative Reasons of Overriding Public Interest

A.6.1 Because of the urgent need to reduce carbon dioxide emissions in order to avoid significant, long-term adverse environmental, social and economic consequences, whilst maintaining security of energy supply and preserving public safety and public health, the Government believes that nuclear generation needs to be part of the future low carbon electricity generation mix.

17 See Chapter 3 of the Habitats Regulations Assessment main report.

A.6.2 Paragraphs A.2.1 to A.3.7 of this analysis have demonstrated the reasons why new nuclear power stations are needed in order for the Government to meet its climate change and energy security objectives. There is therefore a need to allow energy companies to build new nuclear power stations because alternative technologies or approaches will not meet the Government's objectives.

A.6.3 Paragraphs A.4.1 to A.4.7 of the analysis explain how the Government has considered the eleven nominated sites against strategic criteria and a Habitats Regulations Assessment, and concluded that eight are potentially suitable for the development of new nuclear power stations. It has considered whether any non-nominated sites might be considered to be potentially suitable but has concluded that there are none that meet the SSA criteria and that can be shown to be capable of deployment before the end of 2025.

A.6.4 Given the urgent need for new nuclear power stations and the fact that the Government does not believe that there are any other sites that meet the criteria to be considered potentially suitable for new nuclear development, the Government has concluded that it is necessary to include all of the eight potentially suitable sites in the Nuclear NPS. This therefore provides sufficient flexibility for developers to meet the urgent need for new nuclear power stations whilst enabling the IPC to refuse consent should it consider it appropriate to do so.

A.6.5 Paragraphs A.5.1 to A.5.4 of this analysis, informed by the Appraisal of Sustainability, explain why having a Nuclear NPS which lists sites is the most effective way of enabling energy companies to make the necessary investments in new nuclear power stations. The alternatives of not having an NPS, or having an NPS constructed in a different way, would not be compatible with the Government's objectives, which require rapid de-carbonisation of the generation mix.

A.6.6 The Government is therefore satisfied that there are IROPI in making these eight sites available as potential sites for development (subject to the IPC's detailed consideration of the proposals for any site on which an application comes forward) and listing them in the Nuclear NPS even though at this stage potential adverse impacts on European Sites cannot be ruled out. This IROPI case is based on fulfilling the Government's energy policy objectives whilst contributing to wider EU goals for sustainable low-carbon sources of energy as a means of reducing the damaging effects of climate change and ensuring security of energy supplies.

A.6.7 Development proposals will, among other things, need to show that any potential damage to European Sites is fully mitigated. Alternatively, if at that stage adverse impacts are confirmed in respect of development on one of the listed sites, then the developer will be required to follow the requirements set out by the Habitats Directive. This will include, if necessary, consideration of alternatives at the project level, consideration

of IROPI and the development and implementation of compensatory measures in line with the strategic measures set out below. The Government's findings in respect of Article 6(4) of the Habitats Directive and this NPS do not automatically transfer directly to individual projects and the Nuclear NPS does not in any way reduce the duty on the IPC to fulfil the legal requirements of the Habitats Directive.

A.7 Compensatory Measures

A.7.1 Article 6(4) of the Habitats Directive (Regulation 105 of the Habitats Regulations[18]) requires that where, in spite of a negative assessment on a Natura 2000 site(s) integrity, the competent authority proceeds with the plan on the basis of IROPI, any necessary compensatory measures are taken to ensure that the overall coherence of the Natura 2000 network is protected.

A.7.2 Given the strategic nature of the Habitats Regulations Assessment process for this NPS, the inherent uncertainties of the Appropriate Assessment's conclusions and the potential changes that may occur as the plan is implemented[19], it is not possible at this stage to specify the precise nature or location of any compensatory measures that might be required.

A.7.3 The role of the plan is, therefore, to provide a robust framework through the direction it provides to the IPC that sets out the broad parameters for compensation measures, should they be required following the more detailed site level assessments undertaken for plan implementation.

A.7.4 All project level Habitats Regulations Assessments must take account of the potential adverse effects and the proposed avoidance and mitigation measures identified through the strategic level assessment(s).

A.7.5 Where site level assessments identify that compensation is required it must meet the following criteria and be:

- appropriate for the area and the loss caused by the project;
- capable of protecting the overall coherence of the Natura 2000 network;
- capable of implementation;

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18 The Conservation of Habitats and Species Regulations 2010 (SI2010/490)

19 The Habitats Regulations Assessment of the NPS has noted that avoidance and mitigation measures proposed by the assessment may minimise effects (to the point where integrity is no longer affected) or cancel out the negative impacts predicted such that the site level developments may proceed without the need to meet additional requirements under the Habitats Directive. This will need to be assessed on a case by case basis.

- capable of ensuring that the Natura 2000 site is not irreversibly affected by the project before the compensation is in place;
- directed in measurable proportions to the habitats and species negatively affected;
- related to the same biogeographical region (within the UK);
- serves functions that are comparable to those that motivated the original area's submission for designation; and
- clearly defined, with implementation goals and managed so that the compensatory measures can achieve the goal of maintaining or improving the overall coherence of the Natura 2000 network.

ANNEX B: Radioactive Waste Management

B.1 Introduction

B.1.1 The Nuclear White Paper stated 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" [20]. The Government has considered this issue and this Annex sets out the Government's conclusions.

B.1.2 This Annex considers in particular "higher activity waste". On the presumption of a once through fuel cycle for new nuclear power stations (and therefore assuming no reprocessing of spent fuel), higher activity waste will comprise of spent fuel and intermediate level waste (ILW).

B.1.3 Geological disposal is the way in which higher activity waste will be managed in the long term. This will be preceded by safe and secure interim storage until a geological disposal facility can receive waste. A framework to implement this policy was set out in the Managing Radioactive Waste Safely (MRWS) White Paper published in June 2008[21].

B.1.4 New nuclear power stations will also produce other waste streams: low level waste, liquid and gaseous discharges, and non-radioactive wastes. The Government considers that arrangements already exist for the effective management and disposal of wastes in these categories, as demonstrated by the experience of dealing with such wastes from existing nuclear power stations.

B.1.5 The UK has robust legislative and regulatory systems in place for the transport of radioactive wastes, including higher activity waste. Transport of radioactive wastes is, and will continue to be, required to meet a number of national and international requirements to ensure the safety and security of such materials.

B.1.6 In reaching its view on the management and disposal of waste from new nuclear power stations, the Government has had particular regard to:

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20 Meeting the Energy Challenge: A White Paper on Nuclear Power, January 2008, CM 7296, URN 08/525, http://www.berr.gov.uk/files/file43006.pdf, p9

21 MRWS White Paper, http://mrws.decc.gov.uk/

- whether geological disposal of higher activity waste, including waste from new nuclear power stations, is technically achievable;
- whether a suitable site can be identified for the geological disposal of higher activity waste; and
- whether safe, secure and environmentally acceptable interim storage arrangements will be available until a geological disposal facility can accept the higher activity waste.

B.1.7 Each of these issues is addressed in turn in this Annex.

B.2 Whether geological disposal is technically achievable

B.2.1 The Government accepts the Committee on Radioactive Waste Management's (CoRWM[22]) 2006 recommendation on legacy wastes[23] that "within the present state of knowledge, geological disposal is the best available approach for the long-term management of all the material categorised as waste in the CoRWM inventory when compared with the risks associated with other methods of management. The aim should be to progress to disposal as soon as practicable, consistent with developing and maintaining public and stakeholder confidence" [24].

B.2.2 Given international experience and the UK's own research, the Government is confident that a geological disposal facility could be built which would meet regulatory approval. The British Geological Survey reported in 2006 that "over 30% of the UK has suitable geology for siting a deep geological disposal facility"[25] and CORWM found that "there is high confidence in the scientific community that there are areas of the UK where the geology and hydrogeology at 200 metres or more below ground will be stable for a million years and more into the future" [26].

B.2.3 The Nuclear Decommissioning Authority's (NDA) delivery organisation will meet all relevant regulatory requirements in its delivery of the geological

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22 CoRWM's primary task is to provide independent scrutiny on the Government's and NDA's proposals, plans and programmes to deliver geological disposal, together with robust interim storage, as the long term management option for the UK's higher activity wastes: www.corwm.org.uk/

23 "Legacy wastes" is a common term used to describe radioactive waste which already exists or whose arising is committed in future by the operation of an existing nuclear power station.

24 CoRWM Report: *Recommendations to Government*, July 2006, p111, available at. http://www.corwm.org.uk/Pages/Lnk_pages/key_issues.aspx#recommendations

25 UK Nirex Ltd and British Geological Survey, A note by the British Geological Survey and Nirex on the Suitability of UK Geology for Siting a Repository for Radioactive Waste, document 1797, March 2006.

26 CoRWM Report: *Recommendations to Government*, July 2006, page 106.

disposal facility[27,28]. There are a number of geological disposal concepts, based on the use of multiple containment barriers, that have been shown to be capable of meeting high standards of safety and security[29]. The technology to implement these disposal concepts, such as engineered barriers and materials, is already available[30], and although no spent fuel geological disposal facility is currently in operation, programmes in Finland and Sweden are advanced, to the stage of extensive underground investigations. These programmes are on course to have such a facility operational by about 2020.

B.2.4 The Government considers, based on scientific consensus and international experience, that despite some differences in characteristics, waste and spent fuel from new nuclear build would not raise such different technical issues compared with nuclear waste from legacy programmes as to require a different technical solution. The disposability assessments that have been conducted by the NDA as part of the Generic Design Assessment (GDA) process support this view. The assessments have concluded that, compared with legacy wastes and existing spent fuel, no new issues arise that challenge the fundamental disposability of the wastes and spent fuel expected to arise from operation of the reactor designs currently being assessed by the GDA process (EPR and AP-1000). This conclusion is supported by the similarity of the wastes to those expected to arise from the existing pressurised water reactor at Sizewell B. The NDA has concluded that given a disposal site with suitable characteristics, the wastes and spent fuel from the EPR and AP-1000 are expected to be disposable.[31]

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27 The NDA was established to deliver the Government's commitment to deal with the nuclear legacy. It is the body responsible for implementing the Geological Disposal Facility (GDF).

28 MRWS White Paper, p38, http://mrws.decc.gov.uk/

29 The OECD Nuclear Energy Agency, taking inputs from policy-makers, regulators and waste management organisations, has published a statement that geological disposal provides an acceptable and technologically feasible method for the long-term management of long-lived high-activity wastes such as spent fuel: www.nea.fr/html/rwm/reports/2008/nea6433-statement.pdf

30 Posiva Oy (Finland) Environmental Impact Assessment Report: Expansion of the Repository for Spent Fuel, 2008: www.posiva.fi/en/nuclear_waste_management/required_permissions_and_procedures/environmental_impact_assessment_procedure

31 Summary Disposability Assessment for the AP-1000: http://www.nda.gov.uk/documents/upload/TN-17548-Generic-Design-Assessment-Summary-of-DA-for-Wastes-and-SF-arising-from-Operation-of-APPWR-October-2009.pdf.

Summary Disposability Assessment for the EPR: http://www.nda.gov.uk/documents/upload/TN-17548-Generic-Design-Assessment-Summary-of-Disposability-Assessment-for-Wastes-and-Spent-Fuel-arising-from-Operation-of-the-EPWR.pdf.

B.3 Whether a suitable site can be identified

B.3.1 The MRWS White Paper sets out the framework for the implementation of geological disposal, including a flexible site selection process based on voluntarism and partnership. Experience around the world in developing geological disposal facilities demonstrates that this approach is likely to be the most successful way to develop a safe, secure, and environmentally acceptable facility that secures public confidence, which is why the Government has adopted this approach.

B.3.2 The MRWS process for implementing geological disposal is flexible and able to incorporate both robust technical site investigations and ongoing interactions between the project and the potential host community. The Government has therefore not set a fixed delivery timetable, but in planning the implementation of the national policy of geological disposal, the NDA has assessed that a UK facility could be operational for the disposal of legacy ILW by about 2040[32], with legacy High Level Waste/spent fuel emplacement beginning around 2075. Disposal of legacy waste is estimated to be completed by around 2130. It is currently anticipated that disposal of new build wastes would begin once disposal of legacy wastes is completed (though it might be possible to dispose of new build ILW somewhat earlier).

B.3.3 The Government favours a single geological disposal facility for all higher activity wastes if that proves technically possible. However it has not ruled out the alternative of there being more than one facility, and the MRWS site selection process is designed to be sufficiently flexible to accommodate this.

B.3.4 The MRWS White Paper sets out a step-by-step site selection process. Formal “expressions of interest” by communities about potential involvement, which is the first step in the process, have already been received[33].

B.3.5 The Government is committed to making the voluntarist and partnership approach to site selection work through the MRWS process. However, the Government recognises that it has a responsibility to deal with long-term higher activity waste management, is committed to geological disposal as the technical solution, such that it will seek to develop alternative ways to

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32 “Geological Disposal: Steps towards implementation”: http://www.nda.gov.uk/documents/upload/Geological-Disposal-Steps-Towards-Implementation-March-2010.pdf

33 www.copelandbc.gov.uk/PDF/08-PR-%20jun-25%20expression-%20of-%20interest.pdf
www.allerdale.gov.uk/council-and-democracy/council-news/news-releases.aspx?prid=1020
www.cumbriacc.gov.uk/news/2008/december/09_12_2008-121129.asp?Layout=Print

implement that solution if the current framework, as set out in the MRWS White Paper, ultimately proves to be unsuccessful in the UK[34].

B.3.6 As further evidence of its commitment to the implementation of geological disposal, the Government has reviewed and strengthened the arrangements, to provide oversight of geological disposal implementation and hold the NDA to account as the implementation body responsible for delivery.

B.3.7 As stated above, the Government is committed to making the voluntarist and partnership approach to site selection work through the MRWS process. To deliver geological disposal it is necessary to have effective programme management, leadership from Government, clear responsibilities and accountabilities and a timeline and milestones against which progress can be measured. However, this must be reconciled with an approach based on voluntarism. To improve visibility of progress on the MRWS programme, the Government is developing a clear timeline for the implementation of geological disposal, while maintaining its commitment to voluntarism, and will provide annual reports to Parliament on the progress of the MRWS programme.

B.4 Interim Storage

B.4.1 Geological disposal will be preceded by safe and secure interim storage. The first higher activity waste from a new nuclear power station is expected to arise shortly after the power station starts generating electricity, which is currently anticipated to be around 2018. All higher activity waste will have to be stored until a geological disposal facility can accept the waste.

B.4.2 The time that will be required for the safe and secure on-site interim storage of spent fuel and intermediate level waste is contingent on a number of factors, in particular: the operational lifetime of the power station; the availability of disposal facilities; and the location of interim storage facilities.

B.4.3 On the assumption that spent fuel will be stored on-site until it can be disposed of, the key factors in determining the duration of on-site storage are the availability of a GDF and the time required for the spent fuel to cool sufficiently for disposal in a GDF. The NDA's current indicative timetable anticipates a GDF being available to take spent fuel from new nuclear power stations from around 2130, although the future optimisation of plans for the implementation of geological disposal and the expected inventory for disposal indications may provide potential to bring forward this date. Optimisation work will also explore options for reducing the cooling time required for spent fuel prior to disposal. The Government will expect

34 MRWS White Paper, p47, http://mrws.decc.gov.uk/

operators to ensure their waste is disposable when a GDF is anticipated to be available to take the waste.

B.4.4 The Government recognises that interim storage on-site might be required beyond 2130, particularly in the event that a GDF is not available to take the waste. However, there are some factors which might cause this interim storage period to be significantly shorter, for example it is not necessarily the case that the whole interim storage period for the spent fuel produced by a new nuclear power station will be on-site. The Government does not wish to preclude alternative arrangements, for example a central storage facility, if a site can be identified and the necessary regulatory and planning permissions obtained.

B.4.5 Based on domestic and international experience, the Government is satisfied that interim storage facilities are and will be safe and effective, and will remain so for as long as is necessary. For example, the building of new stores and periodic refurbishment of stores if needed, until a geological disposal facility is available. In the event that geological disposal facilities are not available to accept radioactive waste in accordance with the indicative timetable set out above, the Government is satisfied that interim storage will provide an extendable, safe and secure means of containing waste for as long as it takes to site and construct a GDF.

B.4.6 The Government is committed to ongoing research and development to support optimised delivery of the geological disposal programme, and the safe and secure storage of radioactive waste in the interim. The NDA and other organisations are currently carrying out research and development on waste treatment, packaging, storage and geological disposal.

B.5 Conclusions

B.5.1 Having considered this issue, the Government is satisfied that effective arrangements will exist to manage and dispose of the waste that will be produced from new nuclear power stations. As a result, the IPC should not consider this question. However there may be planning issues relating to the on-site management of radioactive waste which it is appropriate for the IPC to consider as part of the development consent application (see Section 2.11 of this NPS).

B.5.2 As set out in Part 1, this NPS has been subject to an Appraisal of Sustainability. The Appraisal of Sustainability has examined the impacts on sustainability if radioactive waste from new nuclear power stations is managed in line with the policies and processes considered by the Government in reaching its conclusion on this issue. The Government has taken into account the potential impacts identified in the Appraisal of Sustainability in making its assessment and has concluded that none of the potential sustainability impacts identified in the Appraisal of Sustainability prevent it from reaching its conclusion.

B.5.3 In line with commitments to review this NPS the Government will keep the arrangements for radioactive waste management and disposal under review and will consider whether any new significant evidence or material that comes forward in the future provides ground for revisiting its conclusion.

ANNEX C: Site assessments

Introduction

C.1.1 The site assessments in this section set out why the sites have been found to be potentially suitable. They include the analysis and conclusions drawn against the SSA criteria and reflect advice received from specialists and the regulators[35]. They also reflect key points made during the opportunity for public comments on nominations in Spring 2009, consultation on the original draft Nuclear NPS running from November 2009 to February 2010, and consultation on the revised draft Nuclear NPS running from October 2010 to January 2011. These are collectively referred to as "responses" throughout this document[36].

35 Office for Nuclear Regulation and Office for Civil Nuclear Security, Environment Agency , Civil Aviation Authority, Ministry of Defence, Department of Transport, Atkins Ltd, MWH Enfusion. The Office for Civil Nuclear Security, along with the Nuclear Installations Inspectorate, were part of the Nuclear Directorate within the Health and Safety Executive. The Nuclear Directorate was replaced by the Office for Nuclear Regulation (ONR), an agency of the Health and Safety Executive, on 1st April 2011. The Government intends to bring forward legislation to bring the ONR outside of the HSE in due course.

36 The site assessments do not reflect every comment or response made. Government Responses to the consultation on the draft and revised draft Nuclear NPS have also been published, which contains a discussion of the key themes raised during the public consultation and the Government's response. These responses can be found at www.energynpsconsultation.decc.gov

C.2 Bradwell

Description of the location

C.2.1 The nominated site comprises part of a former military airfield and land to the east and south of the existing Bradwell nuclear power station, a twin-reactor Magnox power station that operated from 1962 to 2002 and is now being decommissioned by the Nuclear Decommissioning Authority. The majority of the site is arable farmland. The site is located on the south side of the Blackwater Estuary at the northern extremity of the Dengie peninsula some 15km east of the town of Maldon, in the parish of Bradwell-on-Sea within the District of Maldon and the county of Essex. The grid reference of the approximate centre of the site is 601000, 209000. A map of the site is at the end of this annex.

Deployability by the end of 2025

C.2.2 The Strategic Siting Assessment (SSA) considered whether sites are credible for deployment by the end of 2025[37]. This is because it is important to focus on sites which can come on-stream in good time to contribute to the Government's objectives on climate change and energy security. At Bradwell, the Government notes that there is already knowledge about the site developed through the construction and operation of the adjacent power station. However, detailed consideration would still be necessary where there were any changes in circumstances, for instance to take into account new technologies or changes to the site. The Government also notes that a grid connection agreement for a transmission capacity of 1650MW is in place with National Grid, with a connection date of 2021 (although this does not mean that the site would be deployed at that date). The Government is satisfied from the information provided by nominators and an independent assessment that at the point of publication Bradwell is credible for deployment by the end of 2025, regardless of whether it is deployed by that date.

Assessment of suitability against SSA criteria

C1: Demographics

Analysis

C.2.3 The Office for Nuclear Regulationhas advised that none of the site exceeds the semi-urban criterion.

C.2.4 Some responses stated that local populations had increased substantially since the original power station was developed. There was concern about

37 For the purposes of this NPS, "deployment of new nuclear power stations" means commencing operation of one or more new nuclear power stations on the site.

the proximity of the site to West Mersea, and to larger population centres at Maldon, Colchester, Clacton, Southend, Brightlingsea, Wivenhoe and Chelmsford. Some responses said that urban centres were upwind of the site and that this was not taken into account.

C.2.5 The Office for Nuclear Regulation's assessment is based on data from the National Population Database 2, updated in 2008, and therefore takes into account changes in populations since development of the existing power station at Bradwell. In determining the site population factors[38], the Office for Nuclear Regulation's demographic analysis was carried out to a radius of 30km from the proposed site. This took into account population centres out to that distance.

C.2.6 The Office for Nuclear Regulationhas advised that the determination of off-site radiological risk does not assume a single prevailing wind direction but that all wind directions are considered and this is also the case for the on and off-site emergency plans. In the event of an emergency, the prevailing wind direction would be likely to be a factor in the determination of which of the prepared responses, based on different wind directions, would be most appropriate.

C.2.7 Responses were received stating that there was a raised population in the area during the tourist season. The demographics assessment covers permanent night time residents, as identified in census data. Transient holiday populations would be assessed by the Office for Nuclear Regualtion before any licence was granted, should an application come forward. They do not feature as part of this assessment. Transient holiday populations would also be factored into consideration of emergency planning if they were considered to be in relevant areas.

C.2.8 There were also responses on the feasibility of instituting an effective emergency plan for evacuation of the site. A number of responses commented that Mersea Island was located outside the Detailed Emergency Planning Zone (DEPZ) for the existing power station. They were concerned that no emergency evacuation plans would be in place for Mersea Island if a new power station were built and also about how intermittent flooding of the Strood (the road causeway connecting Mersea Island with the mainland) would be accounted for if emergency plans were drawn up. Some responses were also concerned as to how they would be alerted in the event of an incident.

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38 Site population factors are the site demographic characteristics and are derived by the Office for Nuclear Regulation using the approach described here: http://www.hse.gov.uk/aboutus/meetings/iacs/nusac/030708/p12-sittingpaper.pdf

C.2.9 By law[39], all nuclear operators are required to specify and implement adequate arrangements for dealing with an incident or emergency arising on the site and its effects, or the site will not be allowed to operate. The emergency plan is to ensure that members of the public are properly informed and prepared, in advance, about what to do in the unlikely event of a radiation emergency occurring, and provided with information if a radiation emergency actually occurs. This would include an up to date assessment of evacuation routes for the areas which are considered relevant. However, delineation of a new emergency plan is ultimately a decision for a local emergency planning authority on the advice of the Office for Nuclear Regulation, the site operator and others with roles in implementing the off-site emergency plan.

C.2.10 Under guidance issued by the Nuclear Emergency Planning Liaison Group (NEPLG), the "extendibility scenario" of emergency planning requires the consideration of various emergency arrangements out to approximately 15km from a site and evacuation out to 4km, both of which would include Mersea Island. The Emergency Planning Authority which would be responsible for the generation of the off-site emergency plan for a new power station at Bradwell is Essex County Council. The Office for Nuclear Regulation has advised that the purpose of the "extendibility scenario" for any future emergency plan is to make the local authority and others involved in emergency planning aware of factors which may influence the choice and timing of emergency countermeasures. It is not necessarily to determine a particular course of action in advance. Any known factors such as periodic road flooding would feed into such outline planning.

C.2.11 The operator of a nuclear facility will be required to include, within their emergency plan, arrangements for providing notification of an incident to the local authority responsible for implementing the off-site emergency plan. This will include the type of information which should be contained in an initial warning and the arrangements for the provision of more detailed information as it becomes available.

C.2.12 The off-site emergency plan will be required to include arrangements for providing the public with specific information relating to any incident and the behaviour which members of the public should adopt. The current approach of local authorities is typically that people within the Detailed Emergency Planning Zone will be alerted to an incident by an automated telephone messaging system. People in the extendibility zone will be alerted by local media. Both the operator's emergency plan and the Emergency Planning Authority's off-site emergency plan will be subject to

39 Under the Radiation (Emergency Preparedness and Public Information) Regulations 2001 (REPPIR) http://www.hse.gov.uk/radiation/ionising/reppir.htm

review by the Office for Nuclear Regulation as part of the licensing process and in order to comply with REPPIR[40].

Assessment

C.2.13 Development of appropriate emergency plans requires a detailed understanding of the nature of the local residential and working population, capability and redundancy of local infrastructure and capability of local emergency services. Emergency planning zones are designated by the Office for Nuclear Regulation after an application for development consent and licensing has been made and a Report of Assessment required under REPPIR has been received. It would not be appropriate for the Government to pre-empt the decision of where a new emergency planning zone would be. The potential of a site to meet emergency planning requirements cannot, in general, be assessed at a strategic level and has not been assessed in this case as part of the SSA. However, as stated above, a nuclear power station will not be allowed to operate if a satisfactory emergency plan is not in place.

C.2.14 The Office for Nuclear Regulation has advised that none of the site exceeds the semi-urban criterion. This site passes the demographics criterion.

Policy notes

C.2.15 See Section 3.6 of this NPS on flags for local consideration including emergency planning[41].

C2 and D5: Proximity to military activities

Analysis

C.2.16 The Ministry of Defence has advised that the site does not occupy any Ministry of Defence statutory safeguarding zones protecting aerodromes, explosive storage sites, technical sites or ranges and is not within 1000 metres of any Ministry of Defence Danger Areas. No military firing activity occurs in the marine or landward areas adjoining the site. There are no military explosive or military nuclear facilities within 1000 metres of the site. The Ministry of Defence has found that it is reasonable to conclude, at a strategic level, that any likely power station development within the site boundary can be protected against the risk of external hazards created by

40 The Radiation (Emergency Preparedness and Public Information) Regulations 2001 (REPPIR) http://www.hse.gov.uk/radiation/ionising/reppir.htm

41 Flags for Local Consideration are siting criteria that were identified through the SSA consultation in 2008, but which (usually due to the need for detailed site-specific investigations and data) would be more appropriately assessed at the project level.

neighbouring military activities throughout its lifetime[42]. The Office for Nuclear Regulation agreed with this advice.

C.2.17 The proximity of the site to Fingringhoe and Shoeburyness ranges and whether there was any risk posed by explosions at Shoeburyness was raised in responses. Shoeburyness and Fingringhoe are 8.1km and 13.5km away from the site respectively. The Ministry of Defence has advised that all weapon discharges (including ricochets) are contained within the designated Ministry of Defence Danger Areas. A study conducted on Shoeburyness in 2003-04 by Vibrock Ltd[43], an independent specialist in vibration monitoring and control concluded that during the period monitored "at no time…did any events even approach those levels considered necessary for the possible onset of the most cosmetic of damage whether the vibration was ground or airborne".

C.2.18 There was a concern that the former Atomic Weapons Research Establishment at Foulness could pose a risk to the site. The Ministry of Defence advised that the facility was closed some years ago and that the site is now run by QinetiQ for Ministry of Defence testing of conventional munitions which do not pose a risk to the site.

C.2.19 Concerns were also raised as to whether the proximity of the site to Colchester Barracks could increase the risk of terrorist threat to the area. Ministry of Defence has advised that their facilities have appropriate security arrangements in place to counter the threat of terrorism to their own operations such as Colchester Barracks and that it is reasonable to conclude that a nuclear power station development within the site boundary will not adversely affect the capabilities of the armed forces to carry out essential training and operations throughout its lifetime.

C.2.20 The Government acknowledges the security concerns regarding terrorism raised in responses. However, taking all the evidence into account[44] the Government believes that the risks associated with nuclear power are small and that the existing regulatory regime is such that those risks can be effectively managed. The security of civil nuclear material and sites in the UK is regulated by the Office for Nuclear Regulation in accordance with relevant national legislation, which reflects international obligations and guidelines. The Office for Nuclear Regulation places strict obligations on

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42 See entry D2 in the table "The SSA criteria and how the sites were assessed" at the end of this Annex for details on the potential lifetime of the site and the period this assessment covers.

43 An Assessment of Environmental Vibration Produced During Explosive Activities at Shoeburyness, Essex from January 2003 to March 2004, undertaken on behalf of QinetiQ. (Report No. R04.3760/2/DJH, dated 10th November 2005).

44 BERR, *Meeting the Energy Challenge: A White Paper on Nuclear Power*, January 2008, Section 2, http://www.berr.gov.uk/files/file43006.pdf.

site operators and requires site security plans to be approved by it and for the plans to be regularly reviewed.

C.2.21 The Office for Nuclear Regulation and the Environment Agency are currently undertaking a process of Generic Design Assessment (GDA) of new nuclear reactor designs. GDA allows the generic safety, security and environmental implications of new nuclear reactor designs to be assessed up front. The GDA process takes into account all reasonably foreseeable external threats. This includes meteorological phenomena, the effects of climate and landscape change, geological disturbance, seismic activity, flooding and aircraft impact.

Assessment

C.2.22 Based on the advice of the Office for Nuclear Regulation and the Ministry of Defence it is reasonable to conclude that:

- the site does not occupy any Ministry of Defence areas which would give rise to the site being excluded in whole or in part from the assessment;
- the site is not in proximity to or may affect any Ministry of Defence assets or activities to an extent that would suggest that it should be ruled out;
- the development of a new nuclear power station at the site will not affect the capabilities of the armed forces to carry out essential training and operations throughout its lifetime; and
- any likely power station development within the site boundary can be protected against the risk of external hazards created by neighbouring military activities throughout its lifetime.

C.2.23 This site therefore passes these criteria.

C.2.24 In addition, based on the advice and evidence outlined above the Government does not believe that the proximity of Shoeburyness and Fingringhoe to the site poses any direct risk to the site. Should this situation change, any risks from military activity, including ground vibration, would be considered by the Office for Nuclear Regulation as part of licensing.

C.2.25 Given the measures that would have to be in place as a condition of licensing to protect against risk of terrorist threat, the proximity of Colchester Barracks is not considered to affect the potential suitability of the site. The Office for Nuclear Regulation will consider the security of the site as part of the licensing process should an application for development consent come forward.

Policy notes

C.2.26 See Section 5.4 of EN-1 on Civil and Military Aviation and Defence Interests.

D1: Flooding, storm surge and tsunami

Analysis

Flood Zones

C.2.27 The majority of the site is in Flood Zone 3, high probability. This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 20
0 or greater annual probability of flooding from the sea (>0.5%) in any year. The remainder of the site is in Flood Zone 1, low probability. This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%)[45].

C.2.28 Some responses felt that as the site was within Flood Zone 3, it must be unsuitable for development. The Government believes that the fact that a site is in Flood Zone 3 should not prevent a site from being considered potentially suitable for the deployment of a nuclear power station by 2025 if the independent regulator has advised that the site can potentially be protected. At Bradwell the Environment Agency and the Office for Nuclear Regulation have advised that the site can potentially be protected from flood risk, including the effects of climate change, throughout its lifetime (see below).

C.2.29 In addition to considering the availability of other sites in lower flood zones, the Government has taken a sequential approach which involves giving priority to areas at lower risk of flooding[46]. As well as submitting a flood risk assessment in accordance with Section 5.7 of EN-1, this NPS also sets out that the Infrastructure Planning Commission (IPC) will still need to be satisfied that a sequential approach has been applied at the site level to ensure that, where possible, critical infrastructure is located in the lowest flood risk areas within the site.

C.2.30 The Environment Agency has noted that the existing power station site at Bradwell is built approximately 1.8 metres above the 1953 surge tide level and is at a low risk of flooding. The sea wall is lower than the area of raised ground that the power station is built on and does not provide the power station with any flood protection. The Environment Agency has advised that

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45 See PPS25 for a full definition of the Flood Zones and what they cover: Planning Policy Statement 25: Development and Flood Risk, December 2006, Annex D pp.22-25:http://www.communities.gov.uk/documents/planningandbuilding/pdf/planningpolicystatement25.pdf

46 See section 3.7. of this NPS for more detail

current estuarine processes and rising sea-levels place an added pressure on the defences and that the condition of existing defences range from very poor to good. The Appraisal of Sustainability has noted that existing defences may require upgrading over the lifetime of a new power station and this could have potential effects on erosion and visual appearance of the coastline. Whilst the Appraisal of Sustainability finds that these effects are significant, it finds that mitigation opportunities could be available following further study.

C.2.31 The Environment Agency has advised that the access road to the power station rises to high ground so a failure of the seawall would not cause this site to be cut off.

Sea level rise and the effects of climate change

C.2.32 A number of responses were received regarding the vulnerability of Bradwell to flooding, and in particular the potential impacts arising from climate change if waste was stored on site for over 100 years. The Appraisal of Sustainability[47] identified potential adverse effects relating to flood risk arising from predicted rising sea levels caused by climate change, especially during the later stages of operation and decommissioning of a potential nuclear power station.

C.2.33 Waste will be stored in safe and secure interim storage facilities until a geological disposal facility (GDF) becomes available. It is currently anticipated that disposal of new build wastes would begin once disposal of legacy wastes is completed. Geological disposal of higher activity waste from new nuclear power stations is currently expected to be available for new build waste from around 2130[48].

C.2.34 The Environment Agency has advised that it is reasonable to conclude that a nuclear power station within the site could potentially be protected against flood risks throughout its lifetime, including the potential effects of

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47 DECC, *Appraisal of Sustainability site report for Bradwell*, October 2010, www.energynpsconsultation.decc.gov.uk

48 On the assumption that spent fuel will be stored on-site until it can be disposed of, the key factors in determining the duration of on-site storage are the availability of a geological disposal facility (GDF) and the time required for the spent fuel to cool sufficiently for disposal in a GDF. The Nuclear Decommissioning Authority (NDA's) current indicative timetable anticipates a GDF being available to take spent fuel from new nuclear power stations from around 2130, although the future optimisation of plans for the implementation of geological disposal and the expected inventory for disposal indications may provide potential to bring forward this date. Optimisation work will also explore options for reducing the cooling time required for spent fuel prior to disposal. The Government will expect operators to ensure their waste is disposable when a GDF is anticipated to be available to take the waste. See Section B.4 of this NPS for more detail. An indicative timeline for Geological Disposal can be found at http://www.decc.gov.uk/assets/decc/What%20we%20do/UK%20energy%20supply/Energy%20mix/Nuclear/geological-disposal-board/982-geological-disposal-timeline.pdf

climate change, storm surge and tsunami, taking into account possible countermeasures. The Environment Agency has noted in making this assessment that it is likely that any new development at Bradwell would be built on higher or raised ground so reducing the need for protection.

C.2.35 This assessment includes a consideration of sea level rise based on UKCP09 UK climate projections[49]. It is based on a consideration of the capacity of nominated sites to withstand flood risk and coastal erosion including the potential effects of climate change using modelling data that looks ahead to 2100. Predictions of potential climate change effects become increasingly less certain the further into the future that they extend. However, climate change projections will continue to be refined and, as time passes, will project further into the future. As such, should greater future impact be predicted, this should be identified well in advance, giving time for appropriate actions to be taken to address those impacts.

C.2.36 The regulators have also examined the adaptability of the sites to potential changes in flood hazard and are satisfied that additional safeguards are in place to ensure that only suitable sites achieve development and ongoing operational consent. This will also be reviewed in more detail as part of the planning and licensing stage and as part of the Flood Risk Assessment that applicants must undertake in conjunction with their applications to the IPC. Should sites achieve development consent, their capacity to withstand potential climate change will remain under consideration throughout the life of the nuclear power station. Once licensed, as part of the site licensing conditions, the licensee must review their safety case at regular intervals (typically on a ten yearly basis). This review will take the most recent climate change projections into account and allow the necessary modifications to flood defences and/or operating arrangements to be undertaken. The objective of the review is to compare the safety case of the site against modern standards to see if there are reasonably practicable improvements that could be made, to ensure that the plant is safe to continue to operate, including spent fuel and radioactive waste storage for the next defined period.

Different flooding scenarios

C.2.37 Some responses referred to a report commissioned by Greenpeace and authored by Middlesex University Flood Hazard Research Centre, published in March 2007[50], which was said to have concluded that the Bradwell site would be at risk of flooding from rising sea levels and increased frequency of storm surges, arising from global warming.

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49 http://ukclimateprojections.defra.gov.uk/

50 Middlesex University Flood Hazard Research Centre, *The impacts of climate change on nuclear power sites,* 2007, http://www.greenpeace.org.uk/files/pdfs/nuclear/8179.pdf

Responses stated that the Government should publish the implications of the most pessimistic scenarios from the latest available forecasts.

C.2.38 The Environment Agency has advised that the report considers four factors: changes in sea-level to 2080, increase in storm surge height to 2080, changes in sea-level after 2100 and additional sea-level change due to ice sheet melt. The Environment Agency has advised that they used Planning Policy Statement 25 for their considerations during the SSA and there is no significant difference between the assessments of sea level rise up to 2080.

C.2.39 With regard to storm surges, the Environment Agency has advised that the report used UKCIP02 predictions, whilst EDF's nomination report for Bradwell used storm surge predictions from UKCIP06 predictions. The Environment Agency considers that for a strategic assessment there was no significant differences between the considerations. The Environment Agency has also advised that the report contains a "worst case scenario" for ice sheet melt as described in the section headed "Climate Surprise". This scenario is based upon a 2004 report and predicts a 5–6 metre sea level rise, which is significantly higher than the H++ ice melt scenario in UKCP09 which predicts a rise of approximately 2 metres. The Environment Agency consider that UKCP09 is a better source for a "worst case scenario".

C.2.40 In addition to meeting the requirements of Part 5 of EN-1, this NPS sets out that applicants should identify the potential effects of the credible maximum scenario in the most recent projections of marine and coastal flooding. Applicants must then be able to demonstrate that they could achieve further measures for flood management at the site in the future, if future climate change predictions show they are necessary.

Effects of defences

C.2.41 Concerns were expressed that measures to protect the site from coastal erosion and flooding could have a detrimental effect on other parts of the Blackwater Estuary, and could cause flooding elsewhere. Although the Appraisal of Sustainability for Bradwell has noted that measures such as local land raising could increase flood risk to surrounding areas the Environment Agency has advised that it is unlikely that any development would have any adverse impact with respect to flooding on the surrounding area, although it also notes that a site is likely to be built on higher or raised ground.

Assessment

C.2.42 This site passes this criterion. Based on, in particular, the advice of the Environment Agency and the findings of the Appraisal of Sustainability, it is reasonable to conclude that a nuclear power station within the site could potentially be protected against flood risks throughout its lifetime, including

the potential effects of climate change, storm surge and tsunami. This takes into account the potential identified by the Environment Agency to protect the site and to mitigate risks although, as with all sites, the potential effects of any mitigation on the surrounding area will have to be carefully considered as part of a flood risk assessment should any application be forthcoming.

Policy notes

C.2.43 See the relevant guidance in EN-1, including that on flood risk and climate change adaptation.

C.2.44 See the relevant guidance in Part 3 of this NPS, including that on flood risk.

D2: Coastal processes

Analysis

C.2.45 The Environment Agency has advised that development at the site could potentially avoid or mitigate the effects of coastal erosion or other landscape change scenarios throughout its operational lifetime, including the potential effects of climate change[51]. Final proposals are likely to require mitigating actions, for instance the Environment Agency has advised that any new development at Bradwell could be built on higher or raised ground. The Environment Agency has also noted that positioning of the site could limit any future long term effects of coastal erosion.

C.2.46 The Appraisal of Sustainability has identified possible secondary impacts on coastal processes, hydrodynamics and sediment transport from any necessary new or upgraded coastal defences. It has found that mitigation may be possible through appropriate design and construction of defences. The Environment Agency has also advised that the impacts of a power station on the evolution and geomorphology of the Estuary channel may need to be considered, including the impact of elements such as outfalls of cooling water on the adjacent areas in the Estuary and what potential for change this may cause in estuarine flows.

C.2.47 Responses were concerned about the wider impact of any coastal defences required at the site. These concerns centred on coastal processes and squeeze on two internationally designated sites, the Dengie Special Protection Area (SPA) and Ramsar site and Essex Estuaries Special Area of Conservation (SAC) and mitigation was not thought to be likely. The forthcoming Shore Line Management Plan for Essex was also referenced, it was stated that as this will only consider a period up to 2100,

51 See entry D1 in the table “The SSA criteria and how the sites were assessed” at the end of this Annex for details on the potential lifetime of the site and the period this assessment covers.

more detailed modelling and scenario building for the next 200 years was required

C.2.48 The Environment Agency has noted for all nominated sites that protecting the site from flood risk now and in the future prevents the coastline and Estuary from changing and adapting naturally. The Habitats Regulations Assessment report for Bradwell identified that development, particularly proposals for upgraded coastal protection and a marine landing facility, would encroach directly on the margins of the Essex Estuaries SAC and the Blackwater Estuary SPA/Ramsar and the Dengie Estuary SPA/Ramsar sites[52]. These designations are currently under threat from the effects of coastal squeeze which has been identified as a problem in the area. However, the extent of the loss and/or fragmentation of marine, intertidal and terrestrial habitats likely to be attributable to the construction of nuclear reactors, construction areas and other infrastructure and facilities relating to the operation of the nuclear power station is currently unknown. This is because the project design and exact scope of the development and the requirements for coastal or sea defence infrastructure remain undetermined at this stage.

C.2.49 The Habitats Regulations Assessment site report has set out a number of suggested avoidance and mitigation measures. This could include avoiding or minimising losses of habitat through sensitively designed sea defences such as soft engineering for any upgraded coastal protection. It will ultimately be the responsibility of the nominator to suggest appropriate mitigation measures and these would be assessed at the project level.

C.2.50 The second generation of Shoreline Management Plans (SMP2) are designed to provide a 'route map' for local authorities and other decision makers to move from the present situation towards meeting future needs of the coastline. SMP2s identify the most sustainable approaches to managing the risks to the coast in the short term (0-20 years), medium term (20-50 years) and long term (50-100 years). Within these timeframes, SMP2s also include an action plan that prioritises what work is needed to manage coastal processes into the future, and where it will happen.

Assessment

C.2.51 The site passes this criterion. Based on the advice above, it is reasonable to conclude at a strategic level that a nuclear power station within the site could be protected against coastal erosion and other landscape change scenarios, including the potential effects of climate change, for the lifetime of the station, taking into account countermeasures and mitigating actions.

52 DECC, *Habitats Regulations Assessment: site report for Bradwell*, October 2010, www.energynpsconsultation.decc.gov.uk

The potential impacts of development on designated habitats will be taken into account in the project level assessments (including a further project level Habitats Regulations Assessment and an Environmental Statement reporting the findings of a detailed Environmental Impact Assessment) and considered by the IPC as part of the application for development consent.

Policy notes

C.2.52 See Section 5.5 of EN-1 and Section 3.9 of this NPS on coastal change.

D3: Proximity to hazardous industrial facilities and operations

Analysis

C.2.53 A small area in the south west tip of the site is within the land use planning consultation zones for the former COMAH[53] establishment at Supergas. This was decommissioned in 1999. The land may still be covered by a Hazardous Substances Consent which is administered by the local planning authority. However, the map at the end of this annex illustrates that the area of overlap is only an extremely small portion of the nominated land.

C.2.54 The Office for Nuclear Regulation has advised that it is reasonable to conclude that the site can be protected against the risk arising from proximity to hazardous facilities throughout its lifetime taking into account possible countermeasures and mitigating actions. Given the small area of overlap with the consultation zones for the extant Supergas facility, it is likely that should a hazard still be posed, mitigating actions would be available such as siting key buildings away from that area. The Office for Nuclear Regulation has advised that as with all sites during licensing the licence applicant to the Office for Nuclear Regulation will also need to take account of the need for countermeasures to protect nuclear operations from any hazards and risks from any nearby notified major hazard pipelines, based on information from the relevant pipeline operators about their routes and fluids being conveyed.

Assessment

C.2.55 The proximity of the extant Supergas facility does not affect the potential suitability of the site at this stage given the scope for avoidance or mitigation if necessary. This site passes this criterion. It is reasonable to conclude that a new nuclear power station at the site could be protected against risk arising from proximity to hazardous facilities throughout its lifetime.

53 Under the Planning (Control of Major Accident Hazards) Regulations 1999. For more information see: http://www.hse.gov.uk/comah/background/comah99.htm#

C.2.56 As part of their assessment of a proposed power station regulators consider the developer's estimation of the threats posed to the site by nearby hazardous facilities and any proposed mitigating action.

Policy notes

C.2.57 See Section 4.12 of EN-1.

C.2.58 The applicant should demonstrate that they have consulted the Local Planning Authority with regard to the Supergas facility and considered appropriate mitigating actions if necessary.

D4: Proximity to civil aircraft movements

Analysis

C.2.59 The Civil Aviation Authority has advised that it is potentially reasonable to conclude that any likely power station development within the site boundary can be protected against risks from civil aircraft movement. The Office for Nuclear Regulation agreed with this advice. Nuclear power stations in the UK, including the existing facility at Bradwell, receive some protection from aviation activity through the establishment of a Restricted Area at each individual station. This is established by legislation[54]. Typically, such Restricted Areas have a radius of two nautical miles and extend vertically to 2000 feet above the surface. Any aviation activity within a Restricted Area is limited to that specifically permitted by the legislation. The Civil Aviation Authority has advised that a Restricted Area at the site (or an amendment to the existing Restricted Area) could provide a similar level of protection from civil aircraft movements.

C.2.60 The Civil Aviation Authority has also advised that it is potentially reasonable to conclude that neighbouring aerodromes and air traffic control areas can mitigate any effects arising from the Restricted Area around the nominated nuclear power site. Any potential for the existing Bradwell-associated Restricted Area to impact upon operations associated with Southend Airport and upon helicopter activity associated with the power station is mitigated by exemptions within the legislation which allows a restricted height of not less than 1500 feet (rather than 2000) for some Southend Airport related air traffic control procedures only, and allows for helicopter activity associated with the installation.

C.2.61 The Civil Aviation Authority has advised that there are no other known (i.e. marked on Civil Aviation Authority approved charts or promulgated in the UK Aeronautical Information Publication) civilian landing sites in such proximity to the proposed nuclear installation that a new or amended

54 In accordance with Statutory Instrument 2007 No 1929 (The Air Navigation (Restriction of Flying) (Nuclear Installations) Regulations 2007).

Restricted Area would have a material impact on associated operations, and that the current establishment of the existing Bradwell Restricted Area is such that the impact of a new or amended Restricted Area (as described above) upon civil aircraft in transit through local airspace is likely to be negligible.

C.2.62 Responses were received that the site is under the flight path for Stansted, Heathrow and Luton airports. There were also concerns that planned regeneration of Southend Airport could increase the risk of aircraft crash. The Civil Aviation Authority has advised that traffic associated with Heathrow, Stansted and Luton will routinely operate within Controlled Airspace, which over the generic Bradwell area extends vertically no lower than approximately 4500 feet. If regeneration were to take place at Southend Airport, aviation activity would still need to observe any Restricted Area, including a new (or amended) area established in association with a new nuclear development.

Assessment

C.2.63 This site meets this criterion. Given the advice above it is reasonable to conclude that any likely power station development within the site boundary can be protected against risks from civil aircraft movement, and that the effects on air traffic and aerodromes can be potentially mitigated.

Policy notes

C.2.64 See the relevant guidance in EN-1, including that on civil and military aviation and defence interests. See the relevant guidance in Part 3 of this NPS, including that on proximity to aircraft movements.

C.2.65 This sets out, amongst other things, that the applicant should consult any aerodrome – licensed or otherwise – where likely to be affected by the proposed development in preparing an aviation assessment. This should include consultation with Southend Airport.

For D5 see C2

D6: Internationally designated sites of ecological importance[55]

Analysis

C.2.66 There were a number of responses regarding the impacts that a new nuclear power station may have on the nearby designated sites, including the Dengie Estuary SPA and Ramsar site, the Blackwater Estuary SAC

55 These are occasionally referred to as “European Sites”, “European designated sites”, or “sites of European importance”. See entry D6 in the table “The SSA criteria and how the sites were assessed” at the end of this annex for details of these designations and what they cover.

and the Essex Estuaries SAC, and the intertidal mudflats. Some responses said that as these sites are designated under European law Bradwell should not be included in the Nuclear NPS, due to potential adverse effects that may occur to the designated sites.

C.2.67 Effects relating to cooling technology are discussed under D10.

C.2.68 The Appraisal of Sustainability site report has identified that there is the potential for adverse effects on sites and species considered to be of European nature conservation importance. This means that significant strategic effects on biodiversity cannot be ruled out at this stage of the appraisal.

C.2.69 The Appraisal of Sustainability findings on sites of international importance are taken from the Habitats Regulations Assessment[56]. Taking into account the strategic nature of the plan and the information available, the Habitats Regulations Assessment (at this strategic level) cannot rule out potential adverse effects on the Dengie SPA and Ramsar sites, Blackwater Estuary SPA and Ramsar sites, Colne Estuary SPA and Ramsar sites, and the Essex Estuaries SAC, through impacts on water resources and quality, air quality, habitat and species loss and fragmentation, coastal squeeze and disturbance. The designations identified fall immediately adjacent to or slightly within the site boundary and the Habitats Regulations Assessment finds that there is a risk that development activities encroach into these designated areas, for example the potential for a marine landing facility, cooling water infrastructure and upgraded coastal protection measures could all have adverse impacts.

C.2.70 In the wider context, adverse effects can also not be ruled out on the Mid-Essex SPA and Ramsar sites as a whole (for water quality impacts and impacts on birds) and the Abberton Reservoir (for impacts on birds only). With regards to the Outer Thames Estuary SPA, adverse effects on site integrity cannot be ruled out for water resources and quality, habitat and species loss and fragmentation and disturbance pathways.

C.2.71 The assessment has proposed a suite of avoidance and mitigation measures to be considered as part of the project level Habitats Regulations Assessment. At this stage, it is assessed that the effective implementation of these mitigation measures may help to address adverse effects on European Site integrity, but that more detailed project level Habitats Regulations Assessment is required in order to draw conclusions on their effectiveness.

C.2.72 There were some responses about whether the Appraisal of Sustainability and Habitats Regulations Assessment omitted the Outer Thames Estuary

56 DECC, *Habitats Regulations Assessment site report for Bradwell*, October 2010, www.energynpsconsultation.decc.gov.uk

SPA. There was also concern about impacts on land functionally linked to the Blackwater Estuary SPA and the possible effect on brent geese from this SPA, which use the agricultural fields on the Dengie Peninsular for grazing. The Outer Thames Estuary SPA is considered within the Habitats Regulations Assessment for Bradwell .Part of the Outer Thames Estuary SPA falls immediately adjacent to the site at Bradwell and the SPA contains internationally important numbers of wintering red-throated diver. The Habitats Regulations Assessment finds that adverse effects on site integrity cannot be ruled out for water resources and quality, habitat and species loss and fragmentation and disturbance pathways.

C.2.73 The assessment indicates that the potential for significant effects on the Outer Thames SPA should be considered through further assessment at the project level when detailed plans are available. The NPS sets out that a further Habitats Regulations Assessment at the project level is required.

C.2.74 The project level environmental impact assessment, to be undertaken by the developer and considered by the IPC at the planning application stage, should take account of the potential effects that the development may have on qualifying species of interest such as the brent goose. This is the case even if they use habitats outside of designated sites, as noted in paragraph 2.29 of the Habitats Regulations Assessment for Bradwell.

Assessment

C.2.75 The Government notes the scope for avoidance and mitigation identified in the Habitats Regulations Assessment for sites of international importance, and the need for more detailed studies should an application for development consent come forward.

C.2.76 Given that the Habitats Regulations Assessment has not been able to rule out adverse impacts on sites of European nature conservation importance, the Government has carefully considered whether it is appropriate to include this site in the NPS.

C.2.77 Annex A of this NPS sets out that the Government has concluded that there is an Imperative Reason of Overriding Public Interest that favours the inclusion of this site in the Nuclear NPS despite the inability to rule out adverse effects on European Sites at this stage. This takes into account the need for sites to be available for potential deployment by the end of 2025, the lack of alternatives, and the consideration given to compensatory measures. This site therefore passes this criterion.

Policy notes

C.2.78 See the relevant guidance in EN-1, including that on the Environmental Statement, and biodiversity and geological conservation. See the relevant guidance in Part 3 of this NPS, including that on biodiversity and geological conservation.

C.2.79 The IPC should also refer to the Appraisal of Sustainability and Habitats Regulations Assessment for Bradwell and consider whether the applicant's proposals have sufficiently taken into account the issues identified, where they are still relevant.

D7: Nationally designated sites of ecological importance

Analysis

C.2.80 The Appraisal of Sustainability report has considered the potential impacts on nationally designated sites of ecological importance including the reason why any site is of special scientific interest. The Appraisal of Sustainability has identified that there is the potential for adverse effects on sites and species considered to be of national importance, noting the Blackwater Estuary Site of Special Scientific Interest (SSSI) and the Dengie SSSI as being within 5km of the site and potentially significantly affected by development. The Dengie SSSI falls immediately adjacent to the site and there is a risk that development activities encroach into these designated areas, for example the potential for a marine landing facility, cooling water infrastructure and upgraded coastal protection measures could all have adverse impacts.

C.2.81 The Appraisal of Sustainability finds that this means that significant strategic effects on biodiversity cannot be ruled out at this stage of the appraisal. The Appraisal of Sustainability has identified potential for the mitigation or compensation for biodiversity effects, including the creation of replacement habitat for UK designated sites. The Appraisal of Sustainability site report should be referred to for more detail on potential mitigating actions.

C.2.82 Responses questioned whether the Colne SSSI and Sandbeach Meadows SSSI were considered by the assessment, and how the assessment had taken into account Biodiversity Action Plan (BAP) habitats. The Colne Estuary SSSI and Sandbeach Meadows SSSI were both considered in the Appraisal of Sustainability although the conclusions in respect of these sites are not set out in detail in the main body of the Appraisal of Sustainability site report. This is because the Colne Estuary SSSI overlaps with a number of European designated sites of nature conservation interest. Specifically, the Colne Estuary SSSI lies within the Colne Estuary (Mid-Essex Coast Phase 2) SPA and Ramsar sites and most of the SSSI also falls within the Essex Estuaries SAC. The SSSI shares the same nature conservation interests as the overlapping European designated sites.

C.2.83 The European designated sites in the vicinity of Bradwell have been assessed in the Bradwell Habitats Regulations Assessment Report which concludes that adverse effects cannot be ruled out at several of the European Sites, including the Colne Estuary SPA and Ramsar sites and the Essex Estuaries SAC. Given the complex nature of the Mid-Essex SPA

and Ramsar designations, the Habitats Regulations Assessment notes that impacts need to be considered in the wider context which would include the effects on the component SSSIs. The conclusions for the European Sites are also applicable to the Colne Estuary SSSI.

C.2.84 Sandbeach Meadows SSSI was also considered by the assessment[57]. Sandbeach Meadows is a terrestrial site and lies on the Dengie Peninsula approximately 4km to the South East of the site. The grassland within the site supports nationally important numbers of Brent geese in winter. However, the assessment did not identify any strategic significant effects on Sandbeach Meadows SSSI.

C.2.85 The site Appraisal of Sustainability report for Bradwell states that: "biodiversity could also be affected at a more local level if important habitats or species (for example, UK Biodiversity Action Plan (BAP) habitats or species or legally protected species) are present within, or in close proximity to, the site." A list of BAP species and habitats is included in the appendix to Bradwell Site Appraisal of Sustainability.

Assessment

C.2.86 The Government notes that the Appraisal of Sustainability has identified potential impacts on nationally designated sites of ecological importance which it considers of strategic significance. Given the scope for mitigation of biodiversity effects identified in the Appraisal of Sustainability for sites of national importance it is reasonable to conclude that it may be possible to avoid or mitigate impacts.

C.2.87 The Government recognises that whilst it is reasonable to reach this conclusion, there is a risk that there could be remaining effects on nationally designated sites. However, there is a need to ensure sufficient sites are available for development to meet the Government's energy policy objectives, as described in Part 2 of this NPS. In view of this and in view of the limited number of potentially suitable sites, the Government does not think the issues in relation to this criterion are sufficient to justify not including the site in this NPS. The Government has also noted the fact that there will be further detailed assessment of any proposal for the site at project level.

C.2.88 This site passes this criterion.

Policy notes

C.2.89 See the relevant guidance in EN-1, including that on the Environmental Statement, and biodiversity and geological conservation. See the relevant

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57 DECC, *Appendices of the Appraisal of Sustainability for Bradwell*: www.energynpsconsultation.decc.gov.uk

guidance in Part 3 of this NPS, including that on biodiversity and geological conservation.

C.2.90 The IPC should also refer to the Appraisal of Sustainability for Bradwell and consider whether the applicant's proposals have sufficiently taken into account the issues identified, where they are still relevant.

D8: Areas of amenity, cultural heritage and landscape value

Analysis

C.2.91 The Appraisal of Sustainability has noted that there are no significant adverse effects anticipated on nationally designated landscape due to the distance and probable intervening topography. A number of responses commented on the visual impact of the site in general and on a range of amenities around the site, including St Peter's Chapel on Dengie, scheduled monuments and a nearby Saxon Shore Fort. These heritage assets have been considered by the Appraisal of Sustainability, which has identified potential adverse effects on the settings of Othona Roman Fort and St Peter's Chapel, other nearby scheduled monuments, listed buildings and the West Mersea Conservation Area, as well as on buried archaeology of potentially high importance.

C.2.92 The Appraisal of Sustainability finds the effects on the setting of Othona Roman fort and St. Peter's Chapel would be of exceptional significance if development occurs on the eastern side of the site. The report also indentifies possible effects on other nearby scheduled monuments, listed buildings and the West Mersea Conservation Area, as well as on buried archaeology of potentially high importance. However it also notes that mitigation could be applied by siting the proposed facility close to the existing power station on the western side of the site and through appropriate planning and design of construction activities and operational facilities, including adherence to the principles of good design. The site report goes on to state that detailed assessment, including consultation of the Essex Historic Landscape Characterisation, consideration of Conservation Areas and other heritage assets will be required at the project level Environmental Impact Assessment stage, should an application for development consent come forward.

C.2.93 The Appraisal of Sustainability also finds that there are likely to be indirect adverse effects of the development on nearby Special Landscape Areas[58] through inter-visibility. The Appraisal of Sustainability notes that a new nuclear power station would be set in the context of the existing power station at Bradwell which is being decommissioned. However, the landscape around the site is predominantly undeveloped, and is also flat

58 A Special Landscape Area is a non-statutory designation used by local government to categorise sensitive landscape.

and open. The Appraisal of Sustainability has noted that there is some scope for mitigation and potential for a new landscape framework to contribute to existing published local landscape management and restoration guidelines for this local area. However, it is likely that some adverse effects on local landscape will remain.

C.2.94 There was also concern in responses that a proposed development at the site might require cooling towers. The nominator has set out that its preference is for direct cooling at Bradwell, as discussed at paragraph C.2.106.

C.2.95 However, if any proposals for cooling towers came forward, however, they would be considered by the IPC using the guidance in EN-1 including that on visual impact assessment. This sets out that, when considering towers, the IPC should be satisfied that application of modern hybrid cooling technology is not reasonably practicable before giving consent to any development. Modern hybrid towers are typically smaller than natural draught towers. EN-1 sets out that the IPC would have to judge whether the visual effects on sensitive receptors, such as local residents and visitors to the local area, outweigh the benefits of the project. The revised draft Nuclear NPS had noted that this area is flat and predominantly undeveloped. The IPC would consider the nature of the existing landscape.

Assessment

C.2.96 The Government notes that the Appraisal of Sustainability finds that significant adverse effects on nationally designated landscapes are not anticipated.

C.2.97 The potential impacts on local landscape are noted, as are those on Othona Roman Fort and St. Peter's Chapel, although they are also not nationally designated. There may be scope to partially but not entirely mitigate effects on the local landscape given the scale of the potential buildings and flat and open nature of the surroundings. Impact and mitigation measures will need to be considered by the IPC, but at this stage the potential effects on local landscape are not felt sufficient to outweigh the need for sites as set out in Part 2 of this NPS.

C.2.98 This site therefore passes this criterion.

Policy notes

C.2.99 See the relevant guidance in EN-1 and Part 3 of this NPS, including that on landscape and visual impacts, and the historic environment.

C.2.100 The IPC should also refer to the Appraisal of Sustainability and the applicant's proposals for Bradwell and consider whether the applicant's proposals sufficiently avoid or mitigate potential impacts where they are still relevant.

D9: Size of site to accommodate operation

Analysis

C.2.101 The nominated area is approximately 298 hectares. Some responses questioned whether this was large enough, particularly to accommodate interim waste stores. Nominators have indicated that in their view the size of site required for the operation of a permanent site of a single nuclear power unit allowing for operation, maintenance, storage of spent fuel and intermediate level waste would be between 30 to 50 hectares. The Office for Nuclear Regulation concur with this estimate. The Office for Nuclear Regulation has advised that this is of sufficient size and shape for the safe and secure operation of a new nuclear power station. The nominated land has a number of tracks and a public footpath bisecting it. The Office for Nuclear Regulation has noted that it is a security requirement that the license applicant has exclusive rights of access to, and control of, a civil licensed nuclear site and that it is not therefore bisected by any public rights of way.

Assessment

C.2.102 Based on the advice of the Office for Nuclear Regulation it is reasonable to conclude that there is enough land within the boundary nominated to safely and securely operate at least one new nuclear power station, including the safe and secure storage of all the spent fuel and intermediate level waste produced through operation, and from decommissioning, on the site of the station until it can be sent for disposal in a geological disposal facility.

C.2.103 Section 5.10 of EN-1 (Land Use including open space, green infrastructure and green belt) sets out that rights of way, National Trails and areas of access to land (e.g. open access land) are important recreational facilities and that mitigation measures should be considered by the applicant or the IPC as necessary. It also sets out the importance for consideration of coastal recreation and access to the coast. The IPC will consider the implications for development of the creation of a continuous signed and managed route around the coast, as set out in the Marine and Coastal Access Act 2009, using the guidance in EN-1. Possible mitigation measures might include siting certain elements of a station away from public footpaths and/or the provision of realignments to existing or planned rights of way. Given the size of the site it is reasonable to conclude that there is the potential to mitigate these concerns.

Policy notes

C.2.104 The safety and security of a nuclear power station is considered by the Office for Nuclear Regulation as part of the licensing regime. See Part 3 of this NPS for guidance on the relationship between the regulatory framework and the planning regime.

C.2.105 See Section 5.10 of EN-1 on Land Use including open space, green infrastructure and green belt for information on rights of way and coastal access.

D10: Access to suitable sources of cooling

Analysis

C.2.106 The nomination described different cooling technologies including direct water cooling from the Estuary, and indirect cooling using cooling towers. The nomination stated a preference for direct cooling from the Estuary. Some responses were concerned that large cooling towers would be necessary at the site. The nominator of the site has noted that the "direct cooling option will require long cooling water culverts to reach deep water to obtain the coolest water and to permit dispersion of the thermal plume to avoid any significant impact on designated ecological sites" and has indicated that direct cooling is the preferred option for the site if it can be achieved[59]. The Environment Agency has advised that there is access to suitable sources of cooling at the site. However, responses were received expressing concern about the effects of both direct and indirect cooling.

C.2.107 Responses on indirect cooling were concerned that cooling towers may be used if the impacts of direct cooling were considered too great and that this would lead to visual impact. This is discussed under D8.

C.2.108 On direct cooling, there were responses about whether local ecology around the site, including the local oyster beds, could be adversely affected by the intake and outfall of cooling water including impingement and entrainment, chlorination of water, and the larger potential impact of any new power station. There were concerns that this could have a damaging effect on oyster populations and other marine life and therefore could impact on the local fishing industry and the internationally designated Blackwater Estuary SAC.

C.2.109 The Appraisal of Sustainability for Bradwell has identified potential effects on water quality and fish/shellfish populations in nearby coastal waters due to the abstraction and release of sea water for cooling. Indirect effects on nationally and internationally designated habitats, including from the thermal impact of cooling water discharges have also been identified. The Appraisal of Sustainability considers this of potential wider significance because of indirect effects on national and European designated sites. The Environment Agency has advised that there is an important spawning site for herring on Eagle Bank. The Blackwater Estuary provides a major

59 For the nomination documents for Bradwell, and in particular for information on cooling, see: http://www.energynpsconsultation.decc.gov.uk.

nursery ground for herring, sprat, bass, and a range of flatfish species. Migratory trout, smelt, eel and twaite shad are all present.

C.2.110 The permitting process will include an assessment of the impacts of any discharges to the aquatic environment, including impacts on specific designated sites under both the Habitats and Shellfish Waters Directives. The Shellfish Waters Directive applies to coastal waters designated as needing protection or improvement in order to support shellfish life and growth. The Blackwater Estuary is one such area that the Directive applies to. The Directive sets a temperature standard that a discharge must not cause an increase in water temperature of more than 2°C above ambient temperatures in the shellfish waters. In addition various substances, which can be produced in chlorinated discharges, must not reach or exceed levels which are harmful to the shellfish and their larvae. Nonetheless, responses remained concerned that a rise of 2°C could still be damaging. The Environment Agency has advised that the 2°C temperature limit is a European standard and has been agreed across the participating members as a safe limit.

C.2.111 The Environment Agency has reported on the cooling technology options for new nuclear power stations[60]. The report considers past studies on the ecological effects of direct cooling options, although it notes the danger of generalizing from these studies. The studies reveal past negative and positive effects on different species of oyster and their mortality, looking at the effect of, for instance, entrainment and chlorination, and also at examples such as of that in the Blackwater Estuary in the winter of 1962-3, where oyster survival was aided by the proximity to thermal discharge.

C.2.112 The Environment Agency cooling study concludes that direct cooling can still be the Best Available Techniques (BAT) for estuarine and coastal sites, provided that best practice in planning, design, mitigation and compensation are followed. The potential BAT-status of direct cooling has essentially been preserved owing to improved understanding of survivability of the entrainment process, and substantial developments in impingement mitigation techniques. This report also analysed the issue of entrainment, entrapment and impingement of fish in direct cooling systems and made several suggestions for mitigation. These include location and design of intake structures and screens and the use of fish deterrent and fish recovery return systems. There may remain cases where, even with the application of best practice, residual impacts would be unacceptable. Each case would need to be considered individually[61]. The Environment Agency has also advised that any potential impacts would be assessed

60 Environment Agency, *Cooling water options for the new generation of nuclear power stations in the UK,* 2010: http://publications.environment-agency.gov.uk/epages/eapublications.storefront

61 Environment Agency, *Cooling water options for the new generation of nuclear power stations in the UK,* 2010: http://publications.environment-agency.gov.uk/epages/eapublications.storefront

during detailed design and considered in any application for a consent to make discharges. This would require the discharges to meet regulatory standards for the protection of the quality of estuarine or coastal waters in line with future requirements of the Water Framework Directive[62].

C.2.113 Responses were received highlighting that simulations from studies by the University of Essex and the Centre for Environment, Fisheries and Aquaculture Science, an executive agency of the Government, and submitted as evidence to Colchester Borough Council's Bradwell Task and Finish Group (25 March, 2009) have shown that a new outflow pipe would have least environmental impact on the Blackwater Estuary were it to be located where the current one is, and the optimum environmental results was for water intake to come from the deep estuary channel and for outflow to happen south of the deep channel to the east of the inlet.

C.2.114 The Environment Agency has considered the studies carried out by the University of Essex and CEFAS. An operator would need an Environmental Permit issued by the Environment Agency for the cooling water discharges[63]. If proposals come forward, the Environment Agency would consider the acceptability of the environmental impacts before deciding whether a permit can be issued. The Environment Agency will consider these matters in detail if specific proposals come forward together with relevant impact modelling studies and detailed local surveys. The Environment Agency has advised that it is unable to make detailed considerations at this stage because suitable modelling of cooling water discharges cannot be done until there is a detailed proposal accurately stating discharge locations and volumes.

Assessment

C.2.115 Based on the findings of the Appraisal of Sustainability and the Environment Agency in particular it is reasonable to conclude that there is access to suitable sources of cooling at the site. The site passes this criterion.

C.2.116 Potential impacts on ecology and any consequent potential impacts on the fishing industry should be assessed in light of the application to the IPC which will allow a greater analysis of the potential effects. The permitting process and legislative requirements will ensure consideration of the issues raised which are of significance in this location in particular due to the local fishing industry.

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62 The Water Framework Directive: European Directive 2000/60/EC establishing a framework for Community action in the field of water policy

63 The Environmental Permitting (England and Wales) Regulations 2010 came into force on 6 April 2010 and cover all water discharge activities. Water discharge consents will become Environmental Permits, and applications for new discharges will fall under the new regulations.

Policy notes

C.2.117 See the relevant guidance in EN-1, including Section 5.3 on biodiversity and Section 5.5 on coastal change, given that a new development may require offshore infrastructure for intake and outfall.

C.2.118 See the relevant guidance in Part 3 of this NPS, including that on water quality and resources.

C.2.119 See Part 3 of this NPS for guidance on the relationship between the regulatory framework and the planning regime.

Appraisal of Sustainability and Habitats Regulations Assessment for Bradwell

C.2.120 The Planning Act 2008[64] requires an Appraisal of Sustainability to be carried out for all NPSs. The purpose of an Appraisal of Sustainability is to consider the social, economic and environmental impacts of the policy and to suggest possibilities for improving the sustainability of the NPS. The purpose of the Appraisal of Sustainability for Bradwell is to examine the potential positive and negative effects of the site, identify the significance of these effects, and suggest any mitigation possibilities.

C.2.121 The NPS has also been assessed in accordance with the European Habitats Directive. That assessment (the 'Habitats Regulations Assessment') tests whether a plan or project could have an adverse effect on the integrity of European Sites of nature conservation importance. A Habitats Regulations Assessment was carried out on the Bradwell site.

C.2.122 The key findings of the Bradwell Appraisal of Sustainability and Habitats Regulations Assessment highlight areas of significance on, amongst other things:

i) the Appraisal of Sustainability notes that part of the site is in Flood Zone 3 and therefore has a higher risk of flooding, and that defences may require upgrading. The Appraisal of Sustainability finds that this could have potential effects on erosion (see Section 2.31) and visual appearance of the coastline;

ii) nationally and internationally protected sites of ecological importance;

iii) potential effects on water quality and fish/shellfish populations in nearby coastal waters due to the abstraction and release of sea water for cooling;

64 The Planning Act 2008

iv) potential effects on the surrounding local landscape which is predominantly undeveloped (there are no significant adverse effects anticipated on nationally designated landscapes). In turn, potential effects upon the setting of nearby scheduled monuments and listed buildings, and the West Mersea Conservation Area, and on the setting of Othona Roman Fort and St Peter's Chapel;

v) The Appraisal of Sustainability has found that Bradwell is not close to any other nominated site and therefore does not form part of a cluster. This means that regional cumulative effects are not considered relevant for this site. However, the potential for adverse effects from Bradwell and Sizewell on the European designated site of the Outer Thames Estuary indicates that there may be interactions and cumulative effects on biodiversity should both sites be developed.

C.2.123 The outputs of the Appraisal of Sustainability and Habitats Regulations Assessment on the key findings i) to iv) are taken into account in the summaries against the SSA criteria above. On key finding v), interactions between potential developments can be complex and will depend on what relevant proposals have come forward. This can only be properly assessed at the point at which an application for development consent is made.

C.2.124 Paragraph 4.2.1. of EN-1 sets out that when considering cumulative effects, the Environmental Statement that accompanies an application 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 or granted, as well as those already in existence) [65].

Other issues raised during the assessment

C.2.125 This section deals with other common issues at this site that were raised in responses.

Health

C.2.126 The Appraisal of Sustainability for Bradwell has considered strategic effects on human health and well being. The Appraisal of Sustainability looks at a range of different factors and should be referred to for a more in depth assessment.

C.2.127 The Appraisal of Sustainability has found that the rigorous system of regulation of routine discharges from any new nuclear power station at

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65 For guidance on the assessment of cumulative effects, see, for example, Circular 02/99, *Environmental impact assessment*; or *Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions*: http://ec.europa.eu/environment/eia/eia-studies-and-reports/guidel.pdf.

Bradwell should ensure that there are no unacceptable risks to the health of the local population under normal operating conditions.

C.2.128 The Appraisal of Sustainability also concludes that there is a very small risk of adverse health impacts arising from an accidental release of radiation but the multiple safety features within modern nuclear plants makes such an event exceedingly unlikely. Section 3.13 of this NPS (Human health and wellbeing) sets out that the risk of an accident resulting in exposure to radiation for workers, the public and the environment is very small because of the UK's strict regulatory regime. Section 3.13 should be referred to for further guidance.

C.2.129 It is possible that the presence of a nuclear power station may lead to increased stress levels in certain individuals. Overall, the Appraisal of Sustainability finds that likely enhancement in employment, community wealth, housing stock and other associated neighbourhood infrastructure should improve community well-being and health generally.

C.2.130 Responses were particularly concerned about whether there were links between nuclear power stations and cancer. This has been the subject of the work of the Committee on Medical Aspects of Radiation in the Environment (COMARE)[66]. Its view is that there is no evidence for unusual aggregations of childhood cancers in populations living near nuclear power stations in the UK.

C.2.131 COMARE's tenth report considered the incidence of childhood cancer around nuclear installations. These were divided into nuclear power generating stations and other nuclear installations. The results for the power generating stations supported the conclusion that 'there is no evidence from this very large study that living within 25km of a nuclear generating site in Britain is associated with an increased risk of childhood cancer'.

C.2.132 In its eleventh report COMARE examined the general pattern of childhood leukaemia within Great Britain and concluded that 'the search for increased risk levels near to nuclear power generation sites shows no pattern of excess cases of childhood cancer close to the sites of these types of nuclear installations' Among its recommendations, the report said that the incidence of childhood leukaemia and other cancers in the vicinity of Sellafield and Dounreay, which are not power generating stations, was raised and should be kept under surveillance and periodic review.

66 COMARE is an independent scientific advisory committee providing advice on all aspects of health risk to humans exposed to natural and man-made radiation. It has, for over twenty years, investigated the incidence of childhood cancer and other cancers around nuclear sites. All COMARE reports can be found at http://www.comare.org.uk/

C.2.133 Responses raised particular concerns about the findings of the KiKK study[67] undertaken in Germany. Following the publication of the KiKK study, COMARE requested that a reanalysis of the UK childhood cancer data used in COMARE's tenth report be carried out using the same methodology as the KiKK study as far as was possible. This reanalysis – the Bithell paper[68] – was published in December 2008. It showed that, for the UK, the conclusions of the COMARE tenth report remained valid when applying methodology closer to that of the KiKK study on the same dataset. The tenth report did however state that for other nuclear sites the situation was more complicated. The study did demonstrate corresponding results to previously published studies that showed excesses of some types of childhood cancer. These results (excess childhood cancers in Seascale near Sellafield; in Thurso near Dounreay and around Aldermaston, Burghfield and Harwell) have been extensively discussed in previous COMARE reports.

C.2.134 In May 2011 COMARE published as its 14th report a further review of the incidence of childhood cancer around nuclear power stations, with particular reference to the KiKK study and COMARE's 10th and 11th reports. In this 14th report, COMARE found no reason to change its previous advice that there is no evidence to support the view that there is an increased risk of childhood leukaemia and other cancers in the vicinity of nuclear power stations due to radiation effects. COMARE also recommends that the Government keep a watching brief in this area.

C.2.135 Some responses referred to local studies undertaken around the current Bradwell Power Station relating to cancer mortality. A study by Dr. Chris Busby and Richard Bramhall (2002) in the Blackwater area was referenced, with the comment that it had suggested there were excess levels of cancer and higher levels of breast cancer mortality arising from the Bradwell power station. Particular reference was made to leukaemia and cancer occurrences in the local populations being elevated, as well as the effects to children.

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67 The results of the *Kinderkrebs in der Umgebung von Kernkraftwerken* (KiKK) study of childhood cancer in the vicinity of German nuclear power plants between 1980 and 2003 was published in 2008 by the German Childhood Cancer Registry (DKKR), based on data from and designed in consultation with the Federal Office for Radiation Protection (BfS). The KiKK study found that there was a correlation between the distance of the home from the nearest nuclear power station at the time of diagnosis and the risk of developing leukaemia before the fifth birthday. However, it also noted that the exposure to ionising radiation in the vicinity of German nuclear power stations was lower by a factor of 1,000 to 100,000 than the exposure to natural background and medical radiation, and that therefore the findings of the study could not be explained in the present state of radiobiologic and epidemiologic knowledge

68 Bithell et al, Radiation Protection Dosimetry 2008 132(2), Childhood leukaemia near British nuclear installations: methodological issues and recent results, pp191-197: http://rpd.oxfordjournals.org/cgi/content/abstract/132/2/191

C.2.136 COMARE has commented on the study by Dr. Busby and Bramhall and related reports and concluded that "Analyses using correct mortality figures and the most appropriate expected values do not indicate any significant excess of cancer mortality around Bradwell, nor do they indicate any substantial or statistically significant risk of breast cancer mortality in groups of wards bordering the Blackwater Estuary"[69].

C.2.137 Radioactive monitoring carried out in 2009 found generally low concentrations of artificial radionuclides in water, sediment and beach samples and in meat and seafood samples taken around the existing Bradwell nuclear power station. From this sampling, the estimated total annual dose to the public from all sources within the Bradwell area was assessed as being less than 10% of the dose limit for members of the public of 1mSv per year as specified in the Ionising Radiations Regulations 1999[70].

Tourism

C.2.138 Responses raised concerns about the effect a new nuclear power station could have on the tourism industry in the area.

C.2.139 The Appraisal of Sustainability identified that the local countryside and coastal areas are of importance to the local economy through a variety of purposes, one of which is tourism. The Government notes that there are tourism industries in the surrounding area of some existing nuclear facilities. However, it is not possible at this stage to accurately assess whether a new nuclear power station would impact on tourism in the area- the IPC are better placed to consider this at the point at which detailed proposals come forward. Visual impact is likely, although this has to be seen in the context of the existing facility, which is currently being decommissioned. Section 5.12 of EN-1 sets out that the IPC should consider socio-economic effects including those on tourism.

Transport

C.2.140 Some responses raised concerns about whether the local transport network is sufficient to accommodate the increased traffic necessitated by a new station.

C.2.141 The Appraisal of Sustainability has considered the potential environmental and sustainability impacts of transport that could result from new nuclear power stations on the evidence available. It finds that the relatively remote location of the site and a lack of sustainable transport options to the site

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69 http://www.comare.org.uk/statements/comare_statement_bradwell.htm

70 Environment Agency. *Radioactivity In Food and the Environment* 2009 (RIFE 15) report, 2010. This monitoring is conducted annually and can be found at http://www.environment-agency.gov.uk/homeandleisure/110353.aspx

may result in higher emissions from the transport of goods and construction and operational workforce than other nominated sites. This may be significant in terms of regional greenhouse gas emissions. However, the Appraisal of Sustainability finds that this increase in emissions can be partially mitigated through measures, such as green travel plans and construction management plans.

C.2.142 The Appraisal of Sustainability has found that the main impact of the site will be on the minor roads leading to it. The Appraisal of Sustainability finds that this impact can be mitigated to a certain extent by green travel planning promoting alternatives to single car use to the site. This could include provision of dedicated public transport links with connection with existing rail services to the area or promotion of car sharing. The Appraisal of Sustainability finds that the impact of construction traffic could be mitigated by taking advantage of the coastal location of the site, although, it is recognised that no existing port facilities currently serve the site. There are also designated ecological sites along the shore.

C.2.143 The Government recognises that issues such as transport, particularly during the construction phase of a nuclear power station development, may have significant impacts on both local and national infrastructure. The Government believes that to understand the potential impact of a new development on infrastructure will require detailed project specific assessments. The guidance in EN-1, including that on traffic and transport impacts, will be relevant when considering this issue.

Seismic risk

C.2.144 Responses raised concerns about the earthquake that took place around Colchester in 1884. The Seismic Hazard Working Party was inaugurated under the auspices of the Central Electricity Generating Board (CEGB) to undertake seismic hazard reviews of CEGB sites. It examined the effects of the Colchester Earthquake of 1884 in some detail. The Seismic Hazard Working Party concluded that whilst there was considerable damage caused by the event, the actual magnitude of the event was relatively small, and that there was a sharp decay in intensity away from the epicentre. Damage local to Bradwell was restricted to chimney pots falling and roof tile damage[71]. As outlined in the Government response to the SSA Criteria consultation[72] the Office for Nuclear Regulation has advised that seismic risk is more appropriately assessed at site licensing stage when detailed site specific and reactor design information is available. Seismic hazard was therefore identified as an SSA criteria which is flagged for local

71 Seismic Hazard Working Party study, Volume 4.4.

72 BERR, Towards a nuclear national policy statement: Government response to the consultation on the Strategic Siting Assessment process and criteria, January 2009, p.38: http://www.berr.gov.uk/files/file47136.pdf

consideration[73]. This will be done by the ONR as part of licensing. In order to satisfy the regulators that site licence conditions will be met, the designers of the plant will need to demonstrate that the installed plant is able to withstand all site-specific natural hazards including earthquake, flooding or meteorological conditions. The reactor designs being considered under the GDA process are intended for worldwide application, with baseline seismic resistance designs in the area of 0.25g-0.5g peak ground acceleration. This does not therefore affect the potential suitability of the site as part of the SSA.

C.2.145 A concern was also raised about whether cooling systems, such as pipe-work on the seabed or cooling towers or facilities for storage of radioactive waste would be earthquake resistant. The Office for Nuclear Regulation has advised that as part of the licensing process for the site, the safety categorisation and classification of the structures, systems and components will be reviewed. This will identify all items which require seismic resistance, either because of the safety function they perform or because their failure may directly or indirectly challenge safety of the facility. As part of the emergency arrangements for the site, adequate on-site resources will be available following a seismic event to deal with the anticipated safety requirements.

Conclusion on the nominated site at Bradwell

C.2.146 Given that the site meets the SSA criteria, and having considered the evidence from, inter alia, the public, regulators, the Appraisal of Sustainability and Habitats Regulations Assessment site reports, the Government has concluded that the site is potentially suitable.

C.2.147 This assessment has outlined that there are a number of areas which will require further consideration by the applicant, the IPC and/or the regulators should an application for development consent come forward, including amongst other things flood risk, seismic risk, the impact on biodiversity and the potential impacts of cooling technology. However, the Government has concluded that none of these factors is sufficient to prevent the site from being considered as potentially suitable.

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73 Flags for Local Consideration are siting criteria that were identified through the SSA consultation in 2008, but which (usually due to the need for detailed site-specific investigations and data) would be more appropriately assessed at the project level.

C.3 Hartlepool

Description of the site

C.3.1 The nominated site at Hartlepool surrounds the existing Hartlepool nuclear power station and is located at the mouth of the River Tees on the north side of Greatham Creek, opposite Seal Sands. The site is in the Seaton Ward of the Borough of Hartlepool in the Tees Valley. The grid reference of the approximate centre of the nominated site is 452900,527350. A map is included at the end of this annex to this NPS.

C.3.2 The existing Hartlepool nuclear power station is a twin-reactor Advanced Gas-Cooled (AGR) power station which commenced operation in 1983 and is currently expected to operate until 2019.

Deployability by the end of 2025

C.3.3 The Strategic Siting Assessment (SSA) considered whether sites are credible for deployment by the end of 2025. This is because it is important to focus on sites which can come on stream in good time to contribute to the Government's objectives on climate change and energy security.

C.3.4 Whilst the nominator of the site has not commenced detailed site investigations for an Environmental Impact Assessment at Hartlepool, the operation of the adjacent power station means that there is already a great deal of knowledge about the site, and existing infrastructure that could be utilised including roads. There are also existing port and rail facilities in close proximity which could facilitate transport of large components and construction progress. However, there is no grid connection agreement currently in place for the Hartlepool site.

C.3.5 The Government believes that the site has the potential to be deployed by the end of 2025 but that this may require the site to be prioritised by a developer to bring it forward in the required timeframe. The Government is satisfied from the information provided by nominators and an independent assessment that, at the point of publication, Hartlepool is credible for deployment by the end of 2025 regardless of whether it is deployed by that date.

Assessment of suitability against SSA criteria

C1: Demographics

Analysis

C.3.6 Responses were received about the proximity of Seaton Carew, Greatham, and larger population centres such as Stockton, Hartlepool, Middlesbrough, Durham and Redcar. There was a concern that the demographic data used

in the past to assess the suitability of the site for the existing power station was flawed or out of date.

Assessment

C.3.7 The Office for Nuclear Regulation has advised that none of the site exceeds the semi-urban criterion. The northern boundary of the site ranges from 200m to 600m from an area which exceeds the semi-urban criterion.

C.3.8 In determining the site population factors[74] for advising the Government with regard to the demographics criterion in the SSA the Office for Nuclear Regulation's generic demographic analysis was carried out to a radius of 30km from the proposed site and took into account populations out to that distance. The Office for Nuclear Regulation's assessment is based on data from the National Population Database 2, updated in 2008, and therefore takes into account changes in populations since development of the existing power station.

C.3.9 This site passes the demographics criterion.

Policy notes

C.3.10 See Section 3.6 of this NPS on flags for local consideration[75].

C.3.11 Given the proximity of the site boundary to an area which exceeds the semi-urban criterion, the applicant should demonstrate that it has taken the advice of the Office for Nuclear Regulation on demographic risk, and that subject to that advice, the Office for Nuclear Regulation is satisfied that the proposals do not result in a direct radiological hazard being sited in an area which exceeds the semi-urban criterion.

C2 and D5: Proximity to military activities

Analysis

C.3.12 The Ministry of Defence has advised that the site identified does not occupy any Ministry of Defence statutory safeguarding zones protecting aerodromes, explosive storage sites, technical sites or ranges and it is not within 1000 metres of any Ministry of Defence Danger Areas. No military firing activity occurs in the marine or landward areas adjoining the site.

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74 Site population factors are the site demographic characteristics and are derived by the Office for Nuclear Regulation using the approach described here: http://www.hse.gov.uk/aboutus/meetings/iacs/nusac/030708/p12-sittingpaper.pdf

75 Flags for Local Consideration are siting criteria that were identified through the SSA consultation in 2008, but which (usually due to the need for detailed site-specific investigations and data) would be more appropriately assessed at the project level.

There are no military explosive or military nuclear facilities within 1000 metres of the site.

C.3.13 The Ministry of Defence has advised that it is reasonable to conclude, at a strategic level, that any likely power station development within the site boundary can be protected against the risk of external hazards created by neighbouring military activities throughout its lifetime[76]. The Office for Nuclear Regulation has agreed with this advice.

C.3.14 The Ministry of Defence has also advised that it is reasonable to conclude, at a strategic level, that any likely power station development within the site boundary will not adversely affect the capabilities of the armed forces to carry out essential training and operations throughout its lifetime.

Assessment

C.3.15 Based on the advice of the Office for Nuclear Regulation and the Ministry of Defence it is reasonable to conclude that:

- the site does not occupy any Ministry of Defence areas which would give rise to the site being excluded from the assessment;
- the site is not in proximity to any Ministry of Defence assets or activities that would suggest that it should be ruled out. Mitigating actions of impacts have not had to be considered;
- the development of a new nuclear power station at the site will not affect the capabilities of the armed forces to carry out essential training and operations throughout its lifetime; and
- any likely power station development within the site boundary can be protected against the risk of external hazards created by neighbouring military activities throughout its lifetime.

C.3.16 This site therefore passes this criterion.

Policy notes

C.3.17 See Section 5.4 of EN-1 on Civil and Military Aviation and Defence Interests.

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76 See entry D2 in the table “The SSA criteria and how the sites were assessed” at the end of this Annex for details on the potential lifetime of the site and the period this assessment covers.

D1: Flooding, storm surge and tsunami

Analysis

Flood zones

C.3.18 The site is within Flood Zone 3, high probability. This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year[77].

C.3.19 Some responses felt that as the site was within Flood Zone 3, it must be unsuitable for development. The Government believes that the fact that a site is in Flood Zone 3 should not prevent a site from being considered potentially suitable for the deployment of a nuclear power station by 2025 if the independent regulator has advised that the site can be potentially protected. At Hartlepool the Environment Agency and the Office for Nuclear Regulation have advised that the site can potentially be protected from flood risk, including the effects of climate change, throughout its lifetime.

C.3.20 In addition to considering the availability of other sites in lower flood zones, the Government has taken a sequential approach which involves giving priority to areas at lower risk of flooding[78].

C.3.21 In addition to submitting a flood risk assessment in accordance with Section 5.7 of EN-1, this NPS also sets out that the Infrastructure Planning Commission (IPC) will still need to be satisfied that a sequential approach has been applied at the site level to ensure that, where possible, critical infrastructure is located in the lowest flood risk areas within the site.

Sea level rise and effects of climate change

C.3.22 Some responses raised concerns about the vulnerability of the site to inundation caused by sea level rise and whether this had been taken into account during the assessment. The Appraisal of Sustainability identified potential adverse effects relating to flood risk arising from predicted rising sea levels caused by climate change, especially during the later stages of operation and decommissioning of a potential nuclear power station.

C.3.23 Waste will be stored in safe and secure interim storage facilities until a geological disposal facility becomes available. It is currently anticipated that disposal of new build wastes would begin once disposal of legacy wastes is completed. Geological disposal of higher activity waste from new nuclear

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77 See PPS25 for a full definition of the Flood Zones and what they cover: *Planning Policy Statement 25: Development and Flood Risk*, December 2006, Annex D pp.22-25.

78 See section 3.7. of this NPS for more detail

power stations is currently expected to be available for new build waste from around 2130[79].

C.3.24 The Environment Agency has advised that it is reasonable to conclude that any likely power station development within the site could potentially be protected against flood risk throughout its lifetime, including the potential effects of climate change, storm surge and tsunami, taking into account possible countermeasures. The Environment Agency has noted that flood defences would need to be substantial but that there is no apparent technical reason that would prevent this.

C.3.25 This assessment includes a consideration of sea level rise based on UKCP09 UK climate projections[80]. It is based on a consideration of the capacity of nominated sites to withstand flood risk and coastal erosion including the potential effects of climate change using modelling data that looks ahead to 2100. Predictions of potential climate change effects become increasingly less certain the further into the future that they extend. However, climate change projections will continue to be refined and, as time passes, will project further into the future. As such, should greater future impact be predicted, this should be identified well in advance, giving time for appropriate actions to be taken to address those impacts.

C.3.26 The regulators have also examined the adaptability of the sites to potential changes in flood hazard and are satisfied that additional safeguards are in place to ensure that only suitable sites achieve development and ongoing operational consent. This will also be reviewed in more detail as part of the planning and licensing stage and as part of the Flood Risk Assessment that applicants must undertake in conjunction with their applications to the IPC.

C.3.27 Should sites achieve development consent, their capacity to withstand potential climate change will remain under consideration throughout the life of the nuclear power station. Once licensed, as part of the site licensing conditions, the licensee must review their safety case at regular intervals (typically on a ten yearly basis). This review will take the most recent

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79 On the assumption that spent fuel will be stored on-site until it can be disposed of, the key factors in determining the duration of on-site storage are the availability of a geological disposal facility (GDF) and the time required for the spent fuel to cool sufficiently for disposal in a GDF. The Nuclear Decommissioning Authority (NDA's) current indicative timetable anticipates a GDF being available to take spent fuel from new nuclear power stations from around 2130, although the future optimisation of plans for the implementation of geological disposal and the expected inventory for disposal indications may provide potential to bring forward this date. Optimisation work will also explore options for reducing the cooling time required for spent fuel prior to disposal. The Government will expect operators to ensure their waste is disposable when a GDF is anticipated to be available to take the waste. See Section B.4 of this NPS for more detail. An indicative timeline for Geological Disposal can be found at http://www.decc.gov.uk/assets/decc/What%20we%20do/UK%20energy%20supply/Energy%20mix/Nuclear/geological-disposal-board/982-geological-disposal-timeline.pdf

80 http://ukclimateprojections.defra.gov.uk/

climate change projections into account and allow the necessary modifications to flood defences and/or operating arrangements to be undertaken. The objective of the review is to compare the safety case of the site against modern standards to see if there are reasonably practicable improvements that could be made, to ensure that the plant is safe to continue to operate, including spent fuel and radioactive waste storage for the next defined period.

Shoreline Management Plan

C.3.28 A concern was raised in responses that it is current policy on coastal protection to let the sea engulf the land and that this could mean that sand dunes would be washed away exposing the power station to the sea. It is believed that the policy referred to is the Shoreline Management Plan.

C.3.29 The Environment Agency has advised that the current policies for the site, under the Shoreline Management Plan 2, are a combination of hold the line and retreat or 'natural roll back'. The Environment Agency has also stated that if the coastline is protected against erosion to the site this would be contrary to the Shoreline Management Plan where retreat has been identified as the preferred policy. However, if as stated in the nomination report the roll back of the dunes is not expected to impact on the site within its lifetime then there may not be a conflict with the current policies. The Government also notes the likely need to protect the existing site for many years to come.

C.3.30 Links to each Shoreline Management Plan 2, and details of the relevant lead authority, are available through the Environment Agency website. As referenced in EN-1, should an application for development consent come forward, the applicant will need to demonstrate that they have assessed the implications of the proposed project on strategies for managing the coast set out in the latest Shoreline Management Plan.

Other points

C.3.31 The Environment Agency has also noted that flooding could impede access and egress, however, this could be mitigated in the design of routes to ensure that access remains open. The Environment Agency has advised that any flood mitigation measures constructed within the site area are unlikely to have an impact on flooding elsewhere.

C.3.32 The Appraisal of Sustainability has noted that any increase in the height or extent of sea defences (and the incorporation of a new marine landing platform) could also give rise to adverse impacts on the appearance of the existing shoreline. Given the scale of the nominated site the Appraisal of Sustainability finds that it is unlikely that the above effects could be mitigated entirely.

Assessment

C.3.33 This site passes this criterion. This is because, based on the advice of the Environment Agency and the findings of the Appraisal of Sustainability, it is reasonable to conclude that any new nuclear power station on the site could be protected against flood risk throughout its lifetime, including the potential effects of climate change, storm surge and tsunami. In particular, this takes into account the potential identified by the Environment Agency to protect the site and to mitigate risks although, as with all sites, the potential effects of any mitigation on the surrounding area will have to be carefully considered as part of a flood risk assessment should any application be forthcoming. In addition to submitting a flood risk assessment in accordance with Section 5.7 of EN-1, this NPS sets out that the IPC will still need to be satisfied that a sequential approach has been applied at the site level to ensure that, where possible, critical infrastructure is located in the lowest flood risk areas within the site.

C.3.34 The visual impact on the coastline of increased flood defences is not considered to be of a significance that would outweigh the need to ensure sufficient sites are available for development to meet the Government's energy policy objectives, as described in Part 2 of this NPS.

Policy notes

C.3.35 See Section 5.7 of EN-1 and Section 3.7 of this NPS on flood risk and the relevant guidance in EN-1 and Part 3 of this NPS including that on landscape and visual impacts.

D2: Coastal processes

Analysis

C.3.36 The Environment Agency has advised that development at the site could potentially avoid or mitigate the effects of coastal erosion or other landscape change scenarios throughout its operational lifetime, including the potential effects of climate change[81].

C.3.37 There was a concern about the effects that coastal defences may have on adjacent and nearby designated sites. During the consultation it was asked why there were neither projections nor modelling in the Appraisal of Sustainability relating to sediment deposition or erosion on the designated sites or the estuary despite existing historical knowledge.

C.3.38 The Appraisal of Sustainability site report for Hartlepool acknowledges that the site will be likely to require upgraded defences to counteract coastal retreat. It is recognised that these defences have the potential to modify

81 See footnote 76

existing estuarine hydrodynamics and associated movement of sediment, which may have secondary effects on estuary and marine ecosystem structures and functioning. As the site is situated next to several ecologically designated areas (in particular the Teesmouth and Cleveland Coast Special Protection Area (SPA) and Ramsar and Seaton Dunes and Commons Site of Special Scientific Interest (SSSI)), the Appraisal of Sustainability finds that mitigation measures will need to recognise these designations.

C.3.39 The Appraisal of Sustainability also states that a full understanding of the hydrodynamics and sediment transport within the estuary and the use of sensitively designed sea defences (for example using soft engineering designs) could minimise potential effects. Detailed modelling would not be appropriate before proposals including the type of coastal defence or location of intake and outfall have come forward.

Assessment

C.3.40 This site passes this criterion. Based on the advice above it is reasonable to conclude that a nuclear power station at the site can be protected against coastal erosion, including climate change, for the lifetime of the station. Mitigation of the effects of coastal processes may be possible through appropriate design and construction of defences.

Policy notes

C.3.41 See Section 5.5 of EN-1and Section 3.9 of this NPS on coastal change.

D3: Proximity to hazardous industrial facilities and operations

Analysis

C.3.42 Several responses commented on the site's proximity to a number of industrial facilities, in particular the two neighbouring 'upper tier' COMAH[82] establishments, Huntsman Pigments and Norsea Pipeline Ltd.

C.3.43 Based on Health and Safety Executive records, there are three neighbouring 'upper Tier' COMAH establishments whose land use planning consultation zones interact with the site (see map at the end of this annex), namely:

- Huntsman Pigments – Tioxide Europe Ltd at Greatham Works, Tees Road, Hartlepool[83]. All of the nominated site is within the Consultation

82 Under the Planning (Control of Major Accident Hazards) Regulations 1999. See http://www.hse.gov.uk/comah/background/comah99.htm# for more information.

83 This is referred to as "Tioxide Europe Ltd" on the accompanying map at the end of this Annex.

Distance, known as the Outer Zone which is coterminous with the Public Information Zone.

- Norsea Pipeline Ltd (c/o Conoco Phillips) at Seals Sands, Middlesborough. All three Land Use Planning Zones (Inner, Middle and Outer) transect the nominated site. The Inner Zone transects the existing power station and the adjacent, eastern area of the nominated site.

- Fine Organics, Seal Sands, Middlesborough. The nominated site is entirely within the consultation distance, but is beyond the Inner Zone. However, the Middle Zone transects the existing power station and the adjacent Eastern area of the nominated site.

C.3.44 The Office for Nuclear Regulation has noted that the significance of hazards and associated risks from these COMAH[84] establishments, and their mitigation within the nominated site would need to be assessed in detail by the licence applicant as part of a nuclear site licence application. However, the Office for Nuclear Regulation has advised that it is reasonable to conclude, at a strategic level, that any likely power station development within the nominated site boundary could be protected against risk arising from proximity to such hazardous facilities throughout its lifetime, taking into account possible mitigating actions including consideration of individual building design, layout and operation.

C.3.45 The Office for Nuclear Regulation has advised that there is no regulatory stipulation that new nuclear plants cannot be built near to any hazardous industrial processes. There is however a requirement that the implications of siting a new nuclear plant adjacent to any potentially hazardous industrial plants are understood, and that at the strategic siting stage it is not seen as likely that the potential threats from such a plant would preclude deployment of a new nuclear power station.

C.3.46 The Office for Nuclear Regulation's assessment of the site concluded that at a strategic level there were no concerns sufficient to rule out the future use of the site for nuclear development. During any site licensing phase, external hazards would be examined in considerably more detail, and appropriate arrangements and safety justifications developed to take account of any potential threats.

C.3.47 In addition, Office for Nuclear Regulation has advised that as with any proposed nuclear power station, during licensing the licence applicant will need to take account of the need for countermeasures to protect nuclear operations from any hazards and risks from any nearby notified major hazard pipelines, based on information from the relevant pipeline operators

84 Under the Planning (Control of Major Accident Hazards) Regulations 1999. See http://www.hse.gov.uk/comah/background/comah99.htm# for more information.

about their routes and the fluids being conveyed. During licensing the licence applicant will also need to take account of the potential hazards and associated risks identified from the Port Authorities details about hazardous ship cargo movements given the proximity of the port.

C.3.48 Some responses made reference to the 'ghost ships' located at the Teesside Environmental Recycling and Reclamation Centre (TERRC), close to the site boundary, with concerns raised that any explosive materials associated with demolition work on these could present a hazard to the nominated site. The Office for Nuclear Regulation has advised that the present enforcement activity relating to the ships is centred around asbestos removal. This is not considered a relevant hazardous facility that would pose a risk to a nuclear development. As part of their assessment of a proposed power station regulators consider the developer's estimation of the threats posed to the site by nearby hazardous facilities and any proposed mitigating action.

C.3.49 Responses were also concerned that the potential cumulative effects of TERRC had not been fully considered. The Able TERRC shipyard is considered in the Appraisal of Sustainability report for Hartlepool[85] as one of the 'other key projects and developments that might have significant interactions with a new power station'. It identifies potential cumulative effects on landscape. The site's Habitats Regulation Assessment report also considers the Able TERRC shipyard (referred to as the Able Seaton Port) and identifies potential cumulative effects due to light, noise and visual disturbance. However, the Habitats Regulation Assessment identifies possible mitigation measures such as phasing of works to minimize impacts and reiterates that the Habitats Regulation Assessment is an ongoing assessment another project level Habitats Regulation Assessment will take place when detailed plans have been submitted.

Assessment

C.3.50 Given the scope for potential mitigation this site passes this criterion. It is reasonable to conclude that a new nuclear power station at the site could be protected against the risk arising from proximity to hazardous facilities throughout its lifetime taking into account possible countermeasures and mitigating actions.

Policy notes

C.3.51 See Section 4.12 of EN-1.

C.3.52 The applicant should demonstrate that it has consulted the Local Planning Authority where appropriate.

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85 DECC, *Appraisal of Sustainability Report for Hartlepool,* October 2010: www.energynpsconsultation.decc.gov.uk

D4: Proximity to civil aircraft movements

Analysis

C.3.53 The Aviation Authority has advised that it is potentially reasonable to conclude that any likely power station development within the site boundary can be protected against risks from civil aircraft movement. Nuclear power stations in the UK receive some protection from aviation activity through the establishment of a Restricted Area at each individual station. This is established by legislation. Typically, such Restricted Areas have a radius of 2 nautical miles and extend vertically to 2000 feet above the surface. Any aviation activity within a Restricted Area is limited to that specifically permitted by the legislation. The existing Hartlepool facility has an associated Restricted Area. The Civil Aviation Authority has advised that a Restricted Area around the site (or an amendment to the existing Restricted Area) could provide a similar level of protection from civil aircraft movements.

C.3.54 The Civil Aviation Authority has also advised that it is potentially reasonable to conclude that neighbouring aerodromes and air traffic control areas can mitigate any effects arising from the Restricted Area around the nominated nuclear power site. It has noted that the Restricted Area around Hartlepool has the potential to impact upon operations associated with Durham Tees Valley Airport. Such impact is mitigated by the related legislation allowing flights to cross the Restricted Area at a height of not less than 1800 feet above mean sea level, whilst conducting Durham Tees Valley Airport related instrument flight procedures (IFP). It follows that any new (or amended) Restricted Area established in association with the proposed nuclear installation would have a potential to impact upon Durham Tees Valley Airport. Any Government amendment of the legislation which introduced a new Restricted Area (or adaptation of the existing one), would need to similarly mitigate the impact. The legislation would also need to consider power station associated helicopter activity.

C.3.55 No other civil aerodrome safeguarding issue was identified. The Civil Aviation Authority has identified that there are no other known (i.e. marked on Civil Aviation Authority approved charts or promulgated in the UK Aeronautical Information Publication) civilian landing sites in such proximity to the proposed nuclear installation that a new or amended Restricted Area would have a material impact on associated operations. It has also advised that the current establishment of the existing Hartlepool Restricted Area is such that the impact of a new or amended Restricted Area (as described above) upon civil aircraft in transit through local airspace is likely to be negligible.

Assessment

C.3.56 This site meets this criterion. Given the advice above it is reasonable to conclude that any likely power station development within the site boundary

can be protected against risks from civil aircraft movement, and that the effects on air traffic and aerodromes can be potentially mitigated.

Policy notes

C.3.57 See the relevant guidance in EN-1, including that on civil and military aviation and defence interests. See the relevant guidance in Part 3 of this NPS, including that on proximity to aircraft movements.

C.3.58 This sets out, amongst other things, that the applicant should consult any aerodrome – licensed or otherwise – where they are likely to be affected by the proposed development in preparing an aviation assessment. This should include consultation with Durham Tees Valley Airport.

For D5 see C2

D6: Internationally designated sites of ecological importance[86]

Analysis

C.3.59 The Appraisal of Sustainability has considered the local ecology around the site. The Appraisal of Sustainability has concluded that the potential for adverse effects on sites and species considered to be of European nature conservation importance means that significant strategic effects on biodiversity cannot be ruled out at this stage of the appraisal.

C.3.60 The findings of the Appraisal of Sustainability on sites of international importance are taken from the Habitats Regulations Assessment. The Habitats Regulations Assessment has concluded that at this stage, it cannot rule out the potential for adverse effects on four European Sites (Northumbria Coast Special Protection Area (SPA), Northumbria Coast Ramsar, Teesmouth and Cleveland Coast SPA, Teesmouth and Cleveland Coast Ramsar) through potential impacts on water resources and quality, air quality, habitat and species loss and fragmentation and disturbance (noise, light and visual).

C.3.61 The Habitats Regulations Assessment has proposed a suite of avoidance and mitigation measures to be considered as part of any project level Habitats Regulations Assessment. At this stage, it is assessed that the effective implementation of these mitigation measures may help to address adverse effects on European Site integrity, but that a more detailed project level Habitats Regulations Assessment is required in order to draw conclusions on their effectiveness.

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86 These are occasionally referred to as “European Sites”, “European designated sites”, or “sites of European importance”. See entry D6 in the table “The SSA criteria and how the sites were assessed” at the end of this annex for details of these designations and what they cover.

C.3.62 Responses were concerned about the bird species using adversely affected European Sites and a concern about whether the Habitats Regulations Assessment[87] fully appreciated the importance for SPA species of the remaining undeveloped areas adjacent to the estuary and a feeling that further consideration of the loss of functional land (used by SPA species in particular as high tide roosts) needed to be considered further. It was stated that the guidance in the Habitats Regulation Assessment does not go far enough to protect the functional land in stating that 'restoration, enhancement, management and long term monitoring should be sought where possible and incorporated into the overall mitigation package as good practice'. The Government recognizes the importance of maintaining functional land used by SPA species. The site does not preclude the possibility of maintaining a satisfactory area of functional land as it is large and at present detailed proposals, including exactly where development will take place (or how much open space will be retained) are not being assessed. The Environmental Impact Assessment encourages optimisation of the site layout so as to avoid or minimise impacts as well as assessing mitigation measures.

C.3.63 The Habitats Regulations Assessment report also sets out that connectivity of important wildlife corridors around the site should be maintained and opportunities for habitat creation, restoration and enhancement should be sought where possible.

C.3.64 The Appraisal of Sustainability has identified that the land at the northern end of the site is included within the Teesmouth and Cleveland SPA and Ramsar Site (and the Seaton Dunes and Commons SSSI). The Habitats Regulations Assessment report for Hartlepool has identified that habitat loss as a result of construction of the power station and associated infrastructure (such as the cooling water intake and outfall structures and the possible construction of marine off-loading facilities) within Teesmouth and Cleveland Coast SPA and Ramsar sites could result in the direct loss, albeit temporarily, of designated and supporting habitats. The Habitats Regulations Assessment report has set out a number of suggested avoidance and mitigation measures such as avoiding losses of habitat through site layout and design (for example using tunnelling techniques for cooling water infrastructure to minimise impacts on habitats at the surface).

C.3.65 Responses raised that the draft Appraisal of Sustainability omitted mention of the Hartlepool Power Station Local Wildlife Site, located within the site boundary. The assessment has considered impacts on internationally and nationally designated sites of ecological importance, such as SSSIs. Nature and wildlife reserves in local areas may not have statutory status but the Government recognises they can be sites of local importance. The

87 DECC, *Habitats Regulations Assessment: site report for Hartlepool*, October 2010, www.energynpsconsultation.decc.gov.uk

Government considers that impacts upon local sites are more appropriately addressed by the IPC at the development consent stage when Environmental Impact Assessments are undertaken and project level information is available as potential impacts to them will be locally rather than strategically significant.

Assessment

C.3.66 The Government notes the scope for avoidance and mitigation identified in the Habitats Regulations Assessment for sites of international importance, and the need for more detailed studies should an application for development consent come forward. Given that the Habitats Regulations Assessment has not been able to rule out adverse impacts on sites of European nature conservation importance, the Government has carefully considered whether it is appropriate to include this site in this NPS.

C.3.67 Annex A of this NPS sets out that the Government has concluded that there is an Imperative Reason of Overriding Public Interest that favours the inclusion of this site in this NPS despite the inability to rule out adverse effects on European Sites at this stage. This takes into account the need for sites to be available for potential deployment by the end of 2025, the lack of alternatives, and the consideration given to compensatory measures. This site therefore passes this criterion. However, this NPS sets out that a further Habitats Regulations Assessment must be undertaken should a proposal come forward for this site.

Policy notes

C.3.68 See the relevant guidance in EN-1, including that on the Environmental Statement, Habitats Regulations Assessment and biodiversity and geological conservation. See the relevant guidance in Part 3 of this NPS, including that on biodiversity and geological conservation. The IPC should also refer to the Appraisal of Sustainability and Habitats Regulations Assessment for Hartlepool and consider whether the applicant's proposals have sufficiently taken into account the issues identified, where they are still relevant.

C.3.69 See the relevant guidance in EN-1, including that on the Environmental Statement, Habitats Regulations Assessment and biodiversity and geological conservation. See the relevant guidance in Part 3 of this NPS, including that on biodiversity and geological conservation.

D7: Nationally designated sites of ecological importance

C.3.70 The Appraisal of Sustainability has concluded that the potential for adverse effects on sites and species considered to be of national nature conservation importance (the Teesmouth and Cleveland Coast SPA and Ramsar sites, the Seal Sands and the Seaton Dunes and Common SSSI, Coatham Sands SSSI, Cowpen Marsh SSSI and the Teesmouth Nation

Nature Reserve (NNR) sites) means that significant strategic effects on biodiversity cannot be ruled out at this stage of the appraisal.

C.3.71 The Appraisal of Sustainability identifies the following SSSIs of particular concern (within 5km of the site) for which significant effects may occur: Seal Sands SSSI; Seaton Dunes and Common SSSI, Coatham Sands SSSI; Cowpen Marsh SSSI. The Appraisal of Sustainability has identified that the land at the northern end of the site is included within the Teesmouth and Cleveland SPA and Ramsar sites and the Seaton Dunes and Commons SSSI and that this land is likely to support the cooling structure and pipe work which may lead to direct loss and fragmentation of habitat. However, the Appraisal of Sustainability identified that potential exists for the mitigation of biodiversity effects on sites of UK wide importance, including the creation of replacement habitat. Detailed baseline studies will be required to inform the ecological assessment of the proposal.

Assessment

C.3.72 The Government notes that the Appraisal of Sustainability has identified potential impacts on nationally designated sites of ecological importance which it considers to be of strategic significance. Given the scope for mitigation of biodiversity effects identified in the Appraisal of Sustainability for sites of national importance it is reasonable to conclude that it may be possible to avoid or mitigate impacts.

C.3.73 The Government recognises that whilst it is reasonable to reach this conclusion, there is a risk that there could be remaining effects on nationally designated sites. However, there is a need to ensure sufficient sites are available for development to meet the Government's energy policy objectives, as described in Part 2 of this NPS. In view of this and in view of the limited number of potentially suitable sites, the Government does not think the issues in relation to this criterion are sufficient to justify not including the site in the NPS. The Government has also noted the fact that there will be further detailed assessment of any proposal for the site at project level.

C.3.74 This site passes this criterion.

Policy notes

C.3.75 See the relevant guidance in EN-1, including that on the Environmental Statement, and biodiversity and geological conservation. See the relevant guidance in Part 3 of this NPS, including that on biodiversity and geological conservation. The IPC should also refer to the Appraisal of Sustainability and Habitats Regulations Assessment for Hartlepool and consider whether the applicant's proposals have sufficiently taken into account the issues identified, where they are still relevant.

D8: Areas of amenity, cultural heritage and landscape value

Analysis

C.3.76 The Appraisal of Sustainability has identified potential adverse visual effects and some localised impacts on landscape and the seascape character. These include some potentially adverse indirect landscape and visual impacts on the surrounding area, including from parts of the North York Moors National Park, Durham and the North Yorkshire and Cleveland Heritage Coast and designated Conservation Areas. The site is located approximately 20km to the north of the North York Moors National Park, 16km south of the Durham Heritage Coast and 18km north west of the North Yorkshire and Cleveland Heritage Coast.

C.3.77 The Appraisal of Sustainability notes that overall, the new power station would be seen in the context of existing power station facilities and in an industrial setting, prior to any decommissioning. However, the Appraisal of Sustainability finds that further development is still likely to lead to a perceptible deterioration in some views, which would not be able to be fully mitigated, given the scale of possible new buildings.

C.3.78 At a local level, the Appraisal of Sustainability also finds that there is the potential for long-term adverse effects on existing wet grassland, field hedgerows, trees, saltmarsh and/or mudflat. Any increase in the height or extent of sea defences and the incorporation of a new marine landing platform could also give rise to adverse impacts on the appearance of the existing shoreline. Given the scale of the nominated site the Appraisal of Sustainability notes that it is unlikely that the above effects could be mitigated entirely. However, further detailed design at project level will be required to ensure that attempts are made to avoid and reduce any adverse effects.

C.3.79 On cultural heritage, the Appraisal of Sustainability identified that the main effects of the development of a new nuclear power station at the site would be local and within the site boundary. The Appraisal of Sustainability states that a new nuclear power station could adversely impact the setting of scheduled monuments or other cultural heritage sites of regional or national importance, however, this depends on distance and sight lines. The Appraisal of Sustainability lists cultural heritage features in the area which could be affected depending on distance, sight lines and mitigation. These include the nearest scheduled monument of Claxton Medieval Moated site which lies c.5km to the west; three Grade II* listed buildings present within 5km of the existing nuclear power station and site and 51 Grade II listed buildings within approximately 5km. The nearest Conservation Areas are Seaton Carew approximately 1.9km to the north, Greatham approximately 3km to the west and another in Hartlepool, approximately 5km to the north; and an area of historic landscape lies immediately north of the existing power station. There may be a physical

impact if the site is proposed for this area. There is likely to be a setting impact.

C.3.80 The Appraisal of Sustainability finds that archaeological sites in the form of 20th century military buildings are located adjacent to the existing power station. Layers of palaeo-environmental potential may also be present. The Appraisal of Sustainability believes the presence of these features indicates historic activity, spanning at least the 20th century, in the area immediately surrounding the existing facility. As such, the Appraisal of Sustainability finds that the area is likely to be considered of at least local to regional archaeological importance.

C.3.81 There was a concern that the Appraisal of Sustainability failed to mention an historic restricted wreck (UKHO-WO-58963) at Seaton Carew which is one of 63 designated wrecks under the Protection of Wrecks Act (1973) in the UK. The historic wreck has been considered and is referenced in the Appendix to the Appraisal of Sustainability and within the baseline information in the Appraisal of Sustainability site report. The cultural heritage section of the Appraisal of Sustainability[88] reflects that there are possible effects on the wreck site from flood defence works, but these could be avoided through the appropriate siting of flood defence infrastructure. This is not considered of strategic significance at this stage.

Assessment

C.3.82 In making this assessment regard has been given to the purposes of the designation of the National Park in conserving and enhancing the natural beauty, wildlife and cultural heritage of the Park and promoting opportunities for the understanding and enjoyment of the special qualities of those areas by the public.

C.3.83 The site is some distance to the north of the North York Moors National Park, the Durham Heritage Coast and the North Yorkshire and Cleveland Heritage Coast. Whilst visual impacts on these sites are possible, given the distance of the National Park and Heritage Coasts from the facility, the immediate context of the site that would be visible from that distance, and the potentially low significance of effects, this site passes this criterion.

C.3.84 The potential and extent of remaining effects can only be fully assessed when detailed plans come forward. This is because the effects depend on a range of factors including the proposals for minimisation and mitigation, the cooling technology proposed, the location of transmission infrastructure, and the other relevant projects in the area which could cause in combination cumulative effects.

88 DECC, *Appraisal of Sustainability: Site Report for Hartlepool,* October 2010. www.energynpsconsultation.decc.gov.uk

C.3.85 The Government notes that some visual impacts may remain on the local landscape and settings of cultural heritage features depending on distances and sight lines. Impact and mitigation measures will need to be considered by the IPC, but at this stage these potential effects do not outweigh the need to ensure sufficient sites are available for development to meet the Government's energy policy objectives, as described in Part 2 of this NPS, particularly as scope for some mitigation has been identified.

Policy notes

C.3.86 See the relevant guidance in EN-1 and Part 3 of this NPS, including that on landscape and visual impacts.

C.3.87 The IPC should also refer to the Appraisal of Sustainability and the applicant's proposals for Hartlepool and consider whether the applicant's proposals sufficiently avoid or mitigate potential impacts where they are still relevant.

D9: Size of site to accommodate operation

Analysis

C.3.88 The nominated site is approximately 140 hectares. The Office for Nuclear Regulation has advised that this is of sufficient size and shape for the safe and secure operation of a new nuclear power station.

C.3.89 The nominated land is bisected by two publicly accessible roads and a number of footpaths. It is a security requirement that the licence applicant has exclusive rights of access to, and control of, a civil licensed nuclear site and that it is not therefore bisected by any public right of way.

C.3.90 The Office for Nuclear Regulation has advised that there appears to be insufficient land to provide effective defence-in-depth for a nuclear reactor, including the associated turbine hall, spent fuel and intermediate level waste stores in the following areas[89]:

- north of a line drawn between grid references 45332.52797 and 45366.52755, as the land is of inadequate width; and
- south of a line drawn between grid references 45248.52723 and 45273.52718, as the area is of inadequate size.

C.3.91 These parts of the site could still be used for locating supporting infrastructure that has no potential to directly cause a radiological hazard. Whilst these particular areas have insufficient land to provide defence-in-depth, the Office for Nuclear Regulation has confirmed that there is

89 See the map at the end of this annex.

sufficient area within the nominated boundary to provide sufficient defence-in-depth for essential infrastructure.

Assessment

C.3.92 Although some areas of the site have been identified by the Office for Nuclear Regulation as having insufficient land for the effective defence-in-depth for a nuclear reactor (including its associated turbine hall, spent fuel and intermediate level waste stores), based on the advice of the Office for Nuclear Regulation it is reasonable to conclude that overall there is enough land within the boundary nominated to safely and securely operate at least one new nuclear power station. This includes the safe and secure storage of all the spent fuel and intermediate level waste produced through operation, and decommissioning, until it can be sent for disposal in a geological disposal facility.

Policy notes

C.3.93 The safety and security of a nuclear power station is considered by the Office for Nuclear Regulation as part of the licensing regime. See Part 3 of this NPS for guidance on the relationship between the regulatory framework and the planning regime.

D10: Access to suitable sources of cooling

Analysis

C.3.94 The nomination of the site details a number of cooling technologies, but expresses a preference for direct cooling. The advice of the Environment Agency indicates that there appears to be access to potentially suitable sources of cooling at the site.

C.3.95 The Appraisal of Sustainability for Hartlepool notes that discharge of heated water and cooling water abstraction processes can lead to negative impacts on aquatic ecosystems, such as mortality of fish and invertebrates and alteration of habitats. Any impacts to habitats and associated species within the Teesmouth and Cleveland Coast SPA and Ramsar complex would be of particular concern.

C.3.96 The Environment Agency has advised that the Tees Estuary is a recovering industrial estuary which now contains substantial numbers of juvenile marine fish and increasing numbers of migratory salmonids.

Assessment

C.3.97 Based on the findings of the Appraisal of Sustainability and the Environment Agency it is reasonable to conclude that there is access to suitable sources of cooling at the site.

C.3.98 The site passes this criterion.

Policy notes

C.3.99 See the relevant guidance in EN-1, including Section 5.3 on biodiversity and Section 5.5 on coastal change, given that a new development may require offshore infrastructure for intake and outfall.

C.3.100 See the relevant guidance in Part 3 of this NPS, including that on water quality and resources.

C.3.101 See Part 3 of this NPS for guidance on the relationship between the regulatory framework and the planning regime. The Ekofisk pipeline comes ashore close to that part of the nominated area that may be used for a cooling water outfall. The applicant should demonstrate that the impact (if any) of the proximity to the pipeline has been considered with reference to the Local Planning Authority.

Appraisal of Sustainability and Habitats Regulations Assessment for Hartlepool

C.3.102 The Planning Act 2008[90] requires an Appraisal of Sustainability to be carried out for all NPSs. The purpose of an Appraisal of Sustainability is to consider the social, economic and environmental impacts of the policy and to suggest possibilities for improving the sustainability of the NPS. The purpose of the Appraisal of Sustainability for Hartlepool is to examine the potential positive and negative effects of the nominated site, identify the significance of these effects, and suggest any possibilities for mitigation.

C.3.103 The NPS has also been assessed in accordance with the European Habitats Directive. That assessment (the "Habitats Regulations Assessment") tests whether a plan or project could have an adverse effect on the integrity of European Sites of nature conservation importance. A Habitats Regulations Assessment was carried out on the Hartlepool site.

C.3.104 The key findings of the Hartlepool Appraisal of Sustainability and Habitats Regulations Assessment highlight areas of significance including, amongst other things:

i) potential negative effects on seven national and internationally protected conservation sites including Teesmouth and Cleveland Coast SPA and Ramsar sites, and the Seaton Dunes and Common SSSI;

ii) effects on water quality and migratory fish in the region due to the abstraction and release of sea water for cooling;

90 The Planning Act 2008

iii) potential effects on coastal erosion and visual appearance principally as a result of new coastal flood defences that would be required to protect against sea level rise during the lifetime of the site. Potential negative visual impact on the landscape that could potentially be seen from parts of the North York Moors National Park and Cleveland Heritage Coast; and likely positive local effects from employment generated by the development although the regional and national effects are considered to be marginal.

C.3.105 Hartlepool is not close to any other nominated site and therefore does not form part of a cluster. This means that regional cumulative effects are not considered relevant by the Appraisal of Sustainability for this site.

C.3.106 Issues i) to iii) are discussed against the SSA criteria above. Please refer to the Appraisal of Sustainability containing more information on iv).

Other issues raised during the assessment

C.3.107 This section deals with other common issues at this site that were raised in responses.

Health

C.3.108 The Appraisal of Sustainability for Hartlepool has considered strategic effects on human health and well being. The Appraisal of Sustainability looks at a range of different factors and should be referred to for a more in depth assessment.

C.3.109 The Appraisal of Sustainability has found that the rigorous system of regulation of routine discharges from any new nuclear power station at Hartlepool should ensure that there are no unacceptable risks to the health of the local population under normal operating conditions.

C.3.110 The Appraisal of Sustainability also concludes that there is a very small risk of adverse health impacts arising from an accidental release of radiation but the multiple safety features within modern nuclear plants makes such an event exceedingly unlikely. Section 3.13 of this NPS (Human health and wellbeing) sets out that the risk of an accident resulting in exposure to radiation for workers, the public and the environment is very small because of the UK's strict regulatory regime. Section 3.13 should be referred to for further guidance.

C.3.111 It is possible that the presence of a nuclear power station may lead to increased stress levels in certain individuals. Overall, the Appraisal of Sustainability finds that likely enhancement in employment, community wealth, housing stock and other associated neighbourhood infrastructure should improve community well-being and health generally.

C.3.112 Responses were particularly concerned about whether there were links between nuclear power stations and cancer. This has been the subject of the work of the Committee on Medical Aspects of Radiation in the Environment (COMARE)[91]. Its view is that there is no evidence for unusual aggregations of childhood cancers in populations living near nuclear power stations in the UK.

C.3.113 COMARE's tenth report considered the incidence of childhood cancer around nuclear installations. These were divided into nuclear power generating stations and other nuclear installations. The results for the power generating stations supported the conclusion that 'there is no evidence from this very large study that living within 25km of a nuclear generating site in Britain is associated with an increased risk of childhood cancer'.

C.3.114 In its eleventh report COMARE examined the general pattern of childhood leukaemia within Great Britain and concluded that 'the search for increased risk levels near to nuclear power generation sites shows no pattern of excess cases of childhood cancer close to the sites of these types of nuclear installations' Among its recommendations, the report said that the incidence of childhood leukaemia and other cancers in the vicinity of Sellafield and Dounreay, which are not power generating stations, was raised and should be kept under surveillance and periodic review.

C.3.115 Responses raised particular concerns about the findings of the KiKK study[92] undertaken in Germany. Following the publication of the KiKK study, COMARE requested that a reanalysis of the UK childhood cancer data used in COMARE's tenth report be carried out using the same methodology as the KiKK study as far as was possible. This reanalysis – the Bithell paper[93] – was published in December 2008. It showed that, for the UK, the conclusions of the COMARE tenth report remained valid when

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91 COMARE is an independent scientific advisory committee providing advice on all aspects of health risk to humans exposed to natural and man-made radiation. It has, for over twenty years, investigated the incidence of childhood cancer and other cancers around nuclear sites. All reports can be found at *http://www.comare.org.uk/*

92 The results of the *Kinderkrebs in der Umgebung von Kernkraftwerken* (KiKK) study of childhood cancer in the vicinity of German nuclear power plants between 1980 and 2003 was published in 2008 by the German Childhood Cancer Registry (DKKR), based on data from and designed in consultation with the Federal Office for Radiation Protection (BfS). The KiKK study found that there was a correlation between the distance of the home from the nearest nuclear power station at the time of diagnosis and the risk of developing leukaemia before the fifth birthday. However, it also noted that the exposure to ionising radiation in the vicinity of German nuclear power stations was lower by a factor of 1,000 to 100,000 than the exposure to natural background and medical radiation, and that therefore the findings of the study could not be explained in the present state of radiobiologic and epidemiologic knowledge.

93 Bithell et al, Radiation Protection Dosimetry 2008 132(2), Childhood leukaemia near British nuclear installations: methodological issues and recent results, pp191-197: http://rpd.oxfordjournals.org/cgi/content/abstract/132/2/191

applying methodology closer to that of the KiKK study on the same dataset. The tenth report did however state that for other nuclear sites the situation was more complicated. The study did demonstrate corresponding results to previously published studies that showed excesses of some types of childhood cancer. These results (excess childhood cancers in Seascale near Sellafield; in Thurso near Dounreay and around Aldermaston, Burghfield and Harwell) have been extensively discussed in previous COMARE reports.

C.3.116 In May 2011 COMARE published as its 14th report a further review of the incidence of childhood cancer around nuclear power stations, with particular reference to the KiKK study and COMARE's 10th and 11th reports. In this 14th report, COMARE found no reason to change its previous advice that there is no evidence to support the view that there is an increased risk of childhood leukaemia and other cancers in the vicinity of nuclear power stations due to radiation effects. COMARE also recommends that the Government keep a watching brief in this area.

C.3.117 Radioactive monitoring carried out in 2009 found generally low concentrations of artificial radionuclides in water, sediment and beach samples and in meat and seafood samples taken around the existing Hartlepool nuclear power station. From this sampling, the estimated total annual dose to the public from all sources within the Hartlepool area was assessed as being less than 3% of the dose limit for members of the public of 1mSv per year as specified in the Ionising Radiations Regulations 1999[94].

C.3.118 Responses also raised concerns that there were high incidences of thyroid cancer in the Hartlepool area which could be linked to the existing power station. At present local primary care trusts and public health observatories have responsibilities for maintaining surveillance of cancer rates and investigating reports of clusters, including those of adult cancers. COMARE has advised that they are not aware of any reports from either the local primary care trusts or public health observatories that have shown evidence of cancer clusters, including thyroid cancer, in populations around Hartlepool.

Seismic risk

C.3.119 Some responses commented on the presence of a geological fault in the vicinity of the nominated site. It was suggested that this ran underneath the Seaton Meadows landfill site.

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94 Envionment Agency. *Radioactivity In Food and the Environment 2009 (*RIFE 15), 2010. This monitoring is conducted annually and can be found at http://www.environment-agency.gov.uk/homeandleisure/110353.aspx

C.3.120 As outlined in the Government response to the SSA Criteria consultation the Office for Nuclear Regulation has advised that seismic risk is more appropriately assessed at site licensing stage when detailed site specific and reactor design information is available. Seismic hazard was therefore identified as an SSA criteria which is flagged for local consideration[95]. This will be done by the Office for Nuclear Regulation as part of licensing. In order to satisfy the regulators that site licence conditions will be met, the designers of the plant will need to demonstrate that the installed plant is able to withstand all site-specific natural hazards including earthquake, flooding or meteorological conditions. The reactor designs being considered under the Generic Design Assessment (GDA) process are intended for worldwide application, with baseline seismic resistance designs in the area of 0.25g-0.5g peak ground acceleration.

C.3.121 This does not therefore affect the potential suitability of the site for the purposes of the SSA.

Existing land use

C.3.122 Responses were received about the impact of the proposals on existing land-use at and around the site, including that at Able Seaton Port.

C.3.123 The SSA required nominators to supply site boundaries rather than a general location. This was to reduce uncertainty within communities about exactly where a new power station might go. Existing land use and ownership was not a key consideration in the SSA. This was because it is possible, although not inevitable, that land use and ownership could change over the timescales that we are looking at, to 2025. However if nominators were considering nominating land that they did not own, they had to notify the landowner so that the nomination did not come as a surprise and they could feed in their views. Actual requirements for land-use will depend on the eventual choice of technology and the approach to construction.

C.3.124 Should an application for development consent come forward that impacts on existing land use, the guidance in Part 3 of EN-1 on Land Use including Open Space, Green infrastructure and Green belt would be relevant.

Conclusion on the nominated site at Hartlepool

C.3.125 Given that the site meets the SSA criteria, and having considered the evidence from, inter alia, the public, regulators, the Appraisal of Sustainability and Habitats Regulations Assessment site reports, the

95 Flags for Local Consideration are siting criteria that were identified through the SSA consultation in 2008, but which (usually due to the need for detailed site-specific investigations and data) would be more appropriately assessed at the project level.

Government has concluded that the site is potentially suitable for deployment of new nuclear power stations by the end of 2025.

C.3.126 This assessment has outlined that there are a number of areas which will require further consideration by the applicant, the IPC and/or the regulators should an application for development consent come forward, including amongst other things the effects of any proposals on biodiversity including on the Tees Estuary, and consideration of existing land use. However, the Government has concluded that none of these factors is sufficient to prevent the site from being considered as potentially suitable.

C.4 Heysham

Description of the site

C.4.1 The nominated site is located to the east of the existing Heysham nuclear power stations on the Lancashire coast at the south of Morecambe Bay, 8km west of Lancaster. The site is to the south of Heysham Harbour in the civil parish of Heysham within the district of the City of Lancaster and the county of Lancashire. The grid reference of the approximate centre of the site is 340800, 459500.

C.4.2 Of the existing Heysham nuclear power stations Heysham 1 is a twin-reactor Advanced Gas-Cooled (AGR) power station which commenced operation in 1983 and is currently expected to operate until 2019. Heysham 2 is also a twin-reactor AGR power station which commenced operation in 1988 and is currently expected to operate until 2023.

C.4.3 The site occupies an area of drained marsh at the western side of a generally low-lying area of land between the River Lune and Morecambe Bay. The site is adjacent to residential and industrial areas with grazing land to the east. The nominated area includes parts of Heysham Golf Course and Ocean Edge Leisure Park.

Deployability by the end of 2025

C.4.4 The Strategic Siting Assessment (SSA) considered whether sites are credible for deployment by the end of 2025. This is because it is important to focus on sites which can come on stream in good time to contribute to the Government's objectives on climate change and energy security. Whilst the nominator of the site has not commenced detailed site investigations for an Environmental Impact Assessment at Heysham, the operation of the adjacent power station means that there is already a great deal of knowledge about the site. There are rail and port facilities in close proximity to the site. A grid connection agreement for a transmission capacity of 1650 MW is in place with National Grid, with a connection date of 2022 (although this does not automatically mean that a site would be deployed by that date).

C.4.5 The Government is satisfied from the information provided by nominators and an independent assessment that, at the point of publication, Heysham is credible for deployment by the end of 2025 regardless of whether it is deployed by that date.

Assessment of suitability against SSA criteria

C1: Demographics

Analysis

C.4.6 Responses raised concerns about the proximity of the site to areas of high population density and the fact that some areas of the site exceed the semi-urban criterion. The Office for Nuclear Regulation has advised that 32 hectares to the south of the nominated site does not exceed the semi-urban criterion. The remainder of the site exceeds the semi-urban criterion as indicated in the map at the end of this annex.

C.4.7 The purpose of the Government policy on demographics is to limit the consequences to the public in the unlikely event of an airborne radiological release. In the Consultation on the on the SSA Criteria and Process the Government proposed to assess sites against the semi-urban demographic criterion and to exclude from consideration in the SSA areas where the local population density exceeds the semi-urban criterion[96].

C.4.8 The Office for Nuclear Regulation has confirmed that they are satisfied that the elements of a nuclear power station which do have the direct potential to cause radiological hazard could be sited in the 32 hectares which do not exceed the semi-urban criterion (see also D9: Size of site) at Heysham. The Office for Nuclear Regulation has advised that the area of the Heysham site which exceeds the semi-urban criterion could be used for siting of elements of a power station that don't have a direct potential to cause radiological release. For example, administrative offices, staff canteens and car parks do not contribute to any radiological risk to the public and could be located in areas which exceed the semi-urban criterion.

C.4.9 The Office for Nuclear Regulation has also advised that they consider that the site is potentially suitable for the deployment of a new nuclear power station against the demographics criterion. In the event that the Office for Nuclear Regulation received a licence application for the construction of a reactor within the nominated site, as part of the licensing process the Office for Nuclear Regulation would require the licence applicant to demonstrate that the proposed disposition of the nuclear facilities within the site ensured that the semi-urban siting criterion was not exceeded.

C.4.10 In addition, the Office for Nuclear Regulation has commented that the robust and routinely tested emergency arrangements for the existing nuclear licensed sites give them confidence that such arrangements can be adapted to encompass new developments on the nominated site. Although

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96 BERR, *Towards a nuclear national policy statement: Consultation on the Strategic Siting Assessment process and criteria*, July 2008, p.58, http://webarchive.nationalarchives.gov.uk/+/http://www.berr.gov.uk/files/file47136.pdf

the site has not been excluded on the demographics criterion at this stage, this does not guarantee that its demographic features of will be acceptable following detailed regulatory assessment at the site licensing stage.

C.4.11 Whilst the 'semi-urban' criterion was used to provide an initial assessment for the SSA stage, it should be noted that the actual risks associated with any particular station will be site specific. These will therefore depend on the extent to which a nuclear installation meets the relevant targets in the Office for Nuclear Regulation's Safety Assessment Principles. As specific designs for possible nuclear installations have not yet been finalised, any risks will therefore be more appropriately considered by the Office for Nuclear Regulation during the site licensing stage.

Assessment

C.4.12 The Government has carefully considered whether the site is potentially suitable against this criterion given that part of the nominated site exceeds the semi-urban criterion.

C.4.13 The objective of the demographics criterion is to limit the radiological consequences to the public in the unlikely event of an accident involving the spread of radioactive materials beyond the site boundary. The siting of elements of a power station which do not have the direct potential to cause radiological hazard, such as offices and car parks, in the areas which exceed the semi-urban criterion does not add to the risk of radiological consequences for the public. However, to limit the risk to the public, those elements of a power station that do have the potential to cause radiological hazard should be sited within areas which do not exceed the semi-urban criterion.

C.4.14 The Government also notes that the Office for Nuclear Regulation has advised that there is sufficient space within the nominated site to place those areas that have the direct potential to cause radiological hazard in the area which does not exceed the semi-urban criterion. Against criterion D9 the Office for Nuclear Regulation has noted that taken as a whole the site provides sufficient space to allow for the implementation of adequate security arrangements for such a new nuclear site.

C.4.15 The Government has therefore concluded that the nominated site is potentially suitable subject to the siting of the elements of a nuclear power station which have the direct potential to cause radiological hazard in the area which does not exceed the semi-urban criterion.

Policy notes

C.4.16 See Section 3.6 of this NPS on flags for local consideration[97].

C.4.17 An application at the nominated site should only be approved if the elements which have the direct potential to cause radiological hazard are sited in the area which does not exceed the semi-urban criterion, subject to the Office for Nuclear Regulation's advice.

C2 and D5: Proximity to military activities

Analysis

C.4.18 The Ministry of Defence has advised that the site identified does not occupy any Ministry of Defence statutory safeguarding zones protecting aerodromes, explosive storage sites, technical sites or ranges and it is not within 1000 metres of any Ministry of Defence Danger Areas. No military firing activity occurs in the marine or landward areas adjoining the site. There are no military explosive or military nuclear facilities within 1000 metres of the site.

C.4.19 The Ministry of Defence has found that it is reasonable to conclude, at a strategic level, that any likely power station development within the site boundary can be protected against the risk of external hazards created by neighbouring military activities throughout its lifetime[98]. The Office for Nuclear Regulation has agreed with this advice.

C.4.20 Given the proximity to military facilities the Ministry of Defence has also advised that it is reasonable to conclude, at a strategic level, that any likely power station development within the site boundary will not adversely affect the capabilities of the armed forces to carry out essential training and operations throughout its lifetime.

Assessment

C.4.21 Based on the advice of the Office for Nuclear Regulation and the Ministry of Defence it is reasonable to conclude that:

- the site does not occupy any Ministry of Defence areas which would give rise to the site being excluded from assessment;

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97 Flags for Local Consideration are siting criteria that were identified through the SSA consultation in 2008, but which (usually due to the need for detailed site-specific investigations and data) would be more appropriately assessed at the project level.

98 See entry D2 in the table "The SSA criteria and how the sites were assessed" at the end of this Annex for details on the potential lifetime of the site and the period this assessment covers.

- the site is not in proximity to any Ministry of Defence assets or activities that would suggest that it should be ruled out;
- the development of a new nuclear power station at the site will not affect the capabilities of the armed forces to carry out essential training and operations throughout its lifetime; and
- any likely power station development within the site boundary can be protected against the risk of external hazards created by neighbouring military activities throughout its lifetime.

C.4.22 This site therefore passes these criteria.

Policy notes

C.4.23 See Section 5.4 of EN-1 on Civil and Military Aviation and Defence Interests.

D1: Flooding, storm surge and tsunami

Analysis

Flood Zones

C.4.24 The site is located in Flood Zone 1, low probability. This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%)[99].Some responses were received about climate change and rising sea levels and the impact of higher level projections given how long waste may be stored on site. The Appraisal of Sustainability[100] has also identified potential adverse effects relating to flood risk due to rising sea levels, especially during the later stages of operation and decommissioning of any new nuclear power station. There are existing flood defences, but the Appraisal of Sustainability considers that these may need improvement or upgrading and that this could have possible impacts on coastal processes, hydrodynamics and sediment transport. It notes that mitigation may be possible through appropriate design and construction of defences. The Environment Agency has advised that it is reasonable to conclude that a nuclear power station within the site could be protected against flood risk throughout its lifetime, including the potential effects of climate change, storm surge and tsunami, taking into account relevant countermeasures. The Environment Agency

99 See PPS25 for a full definition of the Flood Zones and what they cover: Planning Policy Statement 25: Development and Flood Risk, December 2006, Annex D, pp.22-25. See Section 3.7 of this NPS for information on the sequential approach that the Government has taken to flood risk in the Strategic Siting Assessment.

100 DECC, *Appraisal of Sustainability site report for Heysham*, October 2010, www.energynpsconsultation.decc.gov.uk

has also advised that any flood mitigation measures are unlikely to have any impact elsewhere.

Sea level rise and the effects of climate change

C.4.25 Waste will be stored in safe and secure interim storage facilities until a geological disposal facility becomes available. It is currently anticipated that disposal of new build wastes would begin once disposal of legacy wastes is completed. Geological disposal of higher activity waste from new nuclear power stations is currently expected to be available for new build waste from around 2130[101].

C.4.26 The assessment undertaken by the Environment Agency included a consideration of sea level rise based on UKCP09 UK climate projections[102]. It is based on a consideration of the capacity of nominated sites to withstand flood risk and coastal erosion including the potential effects of climate change using modelling data that looks ahead to 2100. Predictions of potential climate change effects become increasingly less certain the further into the future that they extend. However, climate change projections will continue to be refined and, as time passes, will project further into the future. As such, should greater future impact be predicted, this should be identified well in advance, giving time for appropriate actions to be taken to address those impacts. The regulators have also examined the adaptability of the sites to potential changes in flood hazard and are satisfied that additional safeguards are in place to ensure that only suitable sites achieve development and ongoing operational consent. This will also be reviewed in more detail as part of the planning and licensing stage and as part of the Flood Risk Assessment that applicants must undertake in conjunction with their applications to the Infrastructure Planning Commission (IPC).

C.4.27 Should sites achieve development consent, their capacity to withstand potential climate change will remain under consideration throughout the life of the nuclear power station. Once licensed, as part of the site licensing

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101 On the assumption that spent fuel will be stored on-site until it can be disposed of, the key factors in determining the duration of on-site storage are the availability of a geological disposal facility (GDF) and the time required for the spent fuel to cool sufficiently for disposal in a GDF. The Nuclear Decommissioning Authority (NDA's) current indicative timetable anticipates a GDF being available to take spent fuel from new nuclear power stations from around 2130, although the future optimisation of plans for the implementation of geological disposal and the expected inventory for disposal indications may provide potential to bring forward this date. Optimisation work will also explore options for reducing the cooling time required for spent fuel prior to disposal. The Government will expect operators to ensure their waste is disposable when a GDF is anticipated to be available to take the waste. See Section B.4 of this NPS for more detail. An indicative timeline for Geological Disposal can be found at http://www.decc.gov.uk/assets/decc/What%20we%20do/UK%20energy%20supply/Energy%20mix/Nuclear/geological-disposal-board/982-geological-disposal-timeline.pdf

102 http://ukclimateprojections.defra.gov.uk/

conditions, the licensee must review their safety case at regular intervals (typically on a ten yearly basis). This review will take the most recent climate change projections into account and allow the necessary modifications to flood defences and/or operating arrangements to be undertaken. The objective of the review is to compare the safety case of the site against modern standards to see if there are reasonably practicable improvements that could be made, to ensure that the plant is safe to continue to operate, including spent fuel and radioactive waste storage for the next defined period.

C.4.28 The Environment Agency has noted that access and egress to and within the power station site is possible during extreme flood events, even up to the 0.1% annual event, although the preferred route once off site may be compromised.

C.4.29 The Environment Agency has noted for all nominated sites that protecting the site from flood risk now and in the future prevents the coastline from changing and adapting naturally.

Assessment

C.4.30 This site passes this criterion. This takes into account in particular that there is a low risk of flooding at this site and based on the advice of the Environment Agency and the findings of the Appraisal of Sustainability, it is reasonable to conclude that any new nuclear power station on the site could be protected against flood risk throughout its lifetime, including the potential effects of climate change, storm surge and tsunami.

Policy notes

C.4.31 See Section 5.7 of EN-1 and Section 3.7 of this NPS on flood risk.

D2: Coastal processes

Analysis

C.4.32 The Environment Agency has advised that development at the site could avoid or mitigate the effects of coastal erosion or other landscape change scenarios throughout its lifetime, including the potential effects of climate change.

C.4.33 The Appraisal of Sustainability for Heysham has identified possible impacts on coastal processes, hydrodynamics and sediment transport from any necessary new or upgraded coastal defences. The Appraisal of Sustainability finds that mitigation may be possible through appropriate design and construction of defences, but note that the Morecambe Bay shoreline, inter-tidal sand flats and mud flats and salt marshes are in delicate balance with the prevailing current, wave and tide regime, and any

alteration to the dynamics will change the configuration of the current coastal form.

C.4.34 Some responses commented that if either improvements to the existing coastal defences needed to be made or new coastal defences needed to be constructed, this could have an impact on Morecambe Bay Special Area of Conservation (SAC), Special Protection Area (SPA) and Ramsar site adjacent to the nominated site. It was suggested that changes to the configuration of the current coastal form could potentially affect Morecambe Bay.

C.4.35 The Habitats Regulations Assessment site report for Heysham[103] identified that physical loss of habitat through coastal squeeze, which can arise through the development of flood defences and reinforced coastal margins, is a recorded vulnerability of Morecambe Bay SAC and that any loss of SAC designated habitats or SPA and Ramsar supporting habitats could be considered significant. The extent of the loss and/or fragmentation of marine, intertidal and terrestrial habitats from the construction of nuclear reactors, construction areas and other infrastructure and facilities relating to the operation of the nuclear power station is, however, currently unknown however. This is because the project design and exact scope of the development and the requirements for coastal or sea defence infrastructure remain undetermined at this stage. The potential impacts of development on these habitats will therefore be taken into account in the project level assessments (including a further project level Habitats Regulations Assessment and an Environmental Statement reporting the findings of a detailed Environmental Impact Assessment) and considered by the IPC as part of the application for development consent.

C.4.36 The Habitats Regulations Assessment site report has set out a number of suggested avoidance and mitigation measures for the IPC to consider such as avoiding or minimising losses of habitat through sensitively designed sea defences for example soft engineering for any upgraded coastal protection. The Habitats Regulations Assessment site report also noted that Morecambe Bay SAC is recorded as being relatively robust to its current pressures and over 90% of each of its six component Sites of Special Scientific Interest (SSSIs) are assessed by Natural England as being in favourable condition.

Assessment

C.4.37 This site passes this criterion. Based on the advice above it is reasonable to conclude that a nuclear power station at the site could be protected against coastal erosion, including the effects of climate change, for the

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103 DECC, *Habitats Regulations Assessment: site report for Heysham*, October 2010, www.energynpsconsultation.decc.gov.uk

lifetime of the site. Mitigation of the effects of coastal processes may be possible through appropriate design and construction of defences.

C.4.38 Under the guidance in EN-1 and this NPS further investigation would be undertaken during the detailed design stage of the project should an application for development consent come forward, which would inform the requirement for, and impacts of, mitigation from new or upgraded coastal defences.

Policy notes

C.4.39 See the relevant guidance in EN-1, in particular that on climate change adaptation and coastal change.

C.4.40 See the relevant guidance in Part 3 of this NPS, including that on coastal change and on flood risk.

D3: Proximity to hazardous industrial facilities and operations

Analysis

C.4.41 The Office for Nuclear Regulation has advised that an Upper Tier COMAH[104] establishment at Solvent Resource Management Limited (SRML), Middleton Road, Morecambe is located on the Eastern Boundary of the nominated site. The Public Information Zone for the SRML site extends 500m into the nominated site.

C.4.42 As shown on the map at the end of this annex, the Eastern boundary of the nominated site is crossed by all 3 planning zones, Inner, Middle and Outer (the latter being coterminous with the Public Information Zone).

C.4.43 The Office for Nuclear Regulation has noted that the significance and mitigation of hazards and associated risks from SRML's activities on any new nuclear facilities within the nominated site would need to be assessed by a nuclear site licence applicant during the licensing phase. The Office for Nuclear Regulation has advised that it is reasonable to conclude that a new nuclear power station at the nominated site could be protected against risk arising from proximity to these adjacent hazardous facilities throughout its lifetime, taking into account possible mitigatory actions including individual building design and layout.

C.4.44 Assessment at licensing stage will also need to take into account the hazards and associated risks from:

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104 Under the Planning (Control of Major Accident Hazards) Regulations 1999. See http://www.hse.gov.uk/comah/background/comah99.htm# for more information.

- all notified major hazard pipelines. The licence applicant will need to obtain information from the Local Planning Authority and the relevant pipeline operators, about their routes and properties of fluids being conveyed and if necessary;

- hazardous ship cargo movements through Heysham Port, given its proximity.

C.4.45 There is also a Licensed Explosive installation at Heysham Harbour, and although the proposed nuclear site is beyond the safeguarding zones used for planning purposes around that installation, the Office for Nuclear Regulation advises that it would expect the licence applicant's safety case would confirm that any explosion at that installation would not have unacceptable consequences for nuclear operations.

C.4.46 Concern was raised during the consultation about a specific incident in which ammonia nitrate was said to have been stored on the quayside, and the risk this could have caused the power stations.

C.4.47 The Office for Nuclear Regulation has advised that the presence of Ammonium Nitrate is controlled under the Planning (Hazardous Substances) Act 1990 and the Regulations made under that Act. The Act requires hazardous substances consent (HSC) to be obtained for the presence of hazardous substances at or above specific amounts. With regard to the existing station at Heysham and Heysham Harbour, it is the responsibility of Lancaster City Council to regulate these necessary planning controls.

C.4.48 Lancaster City Council has advised that there is no evidence that a hazardous situation occurred as described. The position regarding substances which would normally be controllable under the regulations, being classified as in transit, is explained in the Department of Communities and Local Government (DCLG) guide for industry to Hazardous Substances Consent[105]. When in transit by road or sea a specific hazardous substances consent is not required for temporary storage on a dock or quay whilst awaiting transfer to ship or rail. This position would be different if regular and lengthy storage on site occurred, and the harbour or other terminal had hazardous materials covered by the consents regime regularly being stored in the vicinity.

C.4.49 Although in the case described it is likely that "in transit" provisions would have applied, the City Council has advised that there are strict security regimes for monitoring and controlling hazardous materials in transit

105 Department for Communities and Local Government, *Hazardous substances consent: a guide for Industry*, December 2000, http://www.communities.gov.uk/documents/planningandbuilding/pdf/hazardoussubstancesguide.pdf

through the port at all times and there is considerable on site security to ensure that all risks are managed appropriately in the vicinity of the power station.

Assessment

C.4.50 This site passes against this criterion. However, given the proximity to hazardous facilities a developer of any nuclear power station within the nominated site boundary would need to demonstrate to the Office for Nuclear Regulation that the facility could be protected against risk arising from adjacent hazardous facilities throughout its lifetime. As part of their assessment of a proposed power station regulators consider the developer's estimation of the threats posed to the site by nearby hazardous facilities and any proposed mitigating action.

Policy notes

C.4.51 See Section 4.12 of EN-1.

C.4.52 The applicant should demonstrate that it has consulted the Local Planning Authority where appropriate.

D4: Proximity to civil aircraft movements

Analysis

C.4.53 The Civil Aviation Authority has advised that it is potentially reasonable to conclude that any likely power station development within the nominated site boundary can be protected against risks from civil aircraft movement. The Office for Nuclear Regulation has agreed with this advice. Nuclear power stations in the UK receive some protection from aviation activity through the establishment of a Restricted Area at each individual station. This is established by legislation. Typically, such Restricted Areas have a radius of 2 nautical miles and extend vertically to 2000 feet above the surface. Any aviation activity within a Restricted Area is limited to that specifically permitted by the legislation. The Civil Aviation Authority has advised that the existing Heysham nuclear installation has an associated Restricted Area and that a Restricted Area around the nominated site (or an amendment to the existing Restricted Area) could provide a similar level of protection from civil aircraft movements.

C.4.54 The Civil Aviation Authority has also advised that it is potentially reasonable to conclude that neighbouring aerodromes and air traffic control areas can mitigate any effects arising from the Restricted Area around the nominated nuclear power site. Middleton Sands, a microlight focused aerodrome, is situated on the southern boundary of the existing Heysham-associated Restricted Area. Any expansion of the Restricted Area to the south would impact upon Middleton Sands-related aviation activity.

C.4.55 The Civil Aviation Authority has advised that there are no other known (i.e. marked on Civil Aviation Authority approved charts or promulgated in the UK Aeronautical Information Publication) civilian landing sites in such proximity to the proposed nuclear installation that a new or amended Restricted Area would have a material impact on associated operations and that the current establishment of the existing Heysham Restricted Area is such that the impact of a new or amended Restricted Area (as described above) upon civil aircraft in transit through local airspace is likely to be negligible.

Assessment

C.4.56 This site meets this criterion. Given the advice above it is reasonable to conclude that any likely power station development within the nominated site boundary can be protected against risks from civil aircraft movement, and that the effects on air traffic and aerodromes can be potentially mitigated.

Policy notes

C.4.57 See the relevant guidance in EN-1, including that on civil and military aviation and defence interests. See the relevant guidance in Part 3 of this NPS, including that on proximity to aircraft movements.

C.4.58 This sets out, amongst other things, that the applicant should consult any aerodrome – licensed or otherwise – where likely to be affected by the proposed development in preparing an aviation assessment. This should include Middleton Sands aerodrome.

For D5 see C2

D6: Internationally designated sites of ecological importance[106]

Analysis

C.4.59 The Appraisal of Sustainability site report has identified that the potential for adverse effects on sites and species considered to be of European nature conservation importance means that significant strategic effects on biodiversity cannot be ruled out at this stage of the appraisal. The Appraisal of Sustainability finds that of greatest concern are activities which might lead to detrimental effects on coastal, intertidal and marine habitats within the Morecambe Bay SAC, part of which overlaps with the nominated site, and species which utilise these habitats, such as great crested newts.

106 These are occasionally referred to as “European Sites”, “European designated sites”, or “sites of European importance”. See entry D6 in the table “The SSA criteria and how the sites were assessed” at the end of this annex for details of these designations and what they cover.

C.4.60 The findings of the Appraisal of Sustainability on sites of international importance are taken from the Habitats Regulations Assessment. Taking into account the strategic nature of the plan and the information available, the Habitats Regulations Assessment at this strategic level cannot rule out likely adverse effects on five European Sites : Leighton Moss SPA and Ramsar, and Morecambe Bay SAC, SPA and Ramsar, through potential impacts on water resources and quality, habitat and species loss and fragmentation or coastal squeeze, disturbance (noise, light and visual), and air quality. This includes, in particular, effects arising from the development of areas of the Morecambe Bay SPA, SAC and Ramsar site within the nominated site and from essential off-site infrastructure.

C.4.61 The Habitats Regulations Assessment has proposed a suite of avoidance and mitigation measures to be considered as part of any project level Habitats Regulations Assessment. At this stage, it is assessed that the effective implementation of these mitigation measures may help to address adverse effects on European Site integrity, but that more detailed project level Habitats Regulations Assessment is required in order to draw conclusions on their effectiveness.

C.4.62 Responses focused on the potential for effects on Morecambe Bay and Leighton Moss SPA and Ramsar sites Responses were concerned that mitigation of all the potential effects from the development of a nuclear power station at Heysham, such as the direct loss of designated land, may not be possible. It was felt that compensation for those impacts may be necessary, and it was stated that it is not clear from the Habitats Regulation Assessment whether it is considered possible to compensate for the loss of designated land, if loss of designated site cannot be avoided. The Habitats Regulations Assessment has proposed a suite of avoidance and mitigation measures to be considered as part of any project level Habitats Regulations Assessment. The Habitats Regulation Assessment site report for Heysham recommends avoidance for any potential direct loss of designation, for example, by tunnelling to reach cooling water. It cannot be determined at this strategic level whether following the consideration of avoidance and mitigation measures, compensation will be required.

Assessment

C.4.63 The Government notes the scope for avoidance and mitigation identified in the Habitats Regulations Assessment for sites of international importance, and the need for more detailed studies should an application for development consent come forward. Given that the Habitats Regulations Assessment has not been able to rule out adverse impacts on sites of European nature conservation importance, the Government has carefully considered whether it is appropriate to include this site in the NPS.

C.4.64 Annex A of this NPS sets out that the Government has concluded that there is an Imperative Reason of Overriding Public Interest that favours the

inclusion of this site in this NPS despite the inability to rule out adverse effects on European Sites at this stage. This takes into account the need for sites to be available for potential deployment by the end of 2025, the lack of alternatives, and the consideration given to compensatory measures. This site therefore passes this criterion.

Policy notes

C.4.65 See the relevant guidance in EN-1, including that on the Environmental Statement, Habitats Regulations Assessment and biodiversity and geological conservation. See the relevant guidance in Part 3 of this NPS, including that on biodiversity and geological conservation.

C.4.66 The IPC should also refer to the Appraisal of Sustainability and Habitats Regulations Assessment for Heysham and consider whether the applicant's proposals have sufficiently taken into account the issues identified, where they are still relevant.

D7: Nationally designated sites of ecological importance

Analysis

C.4.67 The Appraisal of Sustainability site report has identified that the potential for adverse effects on sites and species considered to be of UK nature conservation importance, which the Appraisal of Sustainability finds could be indirectly impacted, means that significant strategic effects on biodiversity cannot be ruled out at this stage of the appraisal. The Appraisal of Sustainability identifies the SSSIs within 5km of the site for which significant effects may occur as Lune Estuary SSSI, Morecombe Bay SSSI and Heysham Moss SSSI.

C.4.68 On sites of UK wide nature conservation importance the Appraisal of Sustainability identified that the potential exists for the mitigation of biodiversity effects including the creation of replacement habitat. The Appraisal of Sustainability has found that detailed baseline studies would be required to inform the ecological assessment of the proposal if an application for development consent came forward.

C.4.69 Some responses highlighted that, whilst not nationally designated sites, the Strategic Site Assessment had not captured the presence of Heysham Nature Reserve, a County Wildlife Site, and Heysham Golf Course Reedbed.

C.4.70 The SSA, as a strategic level assessment, has considered impacts on internationally and nationally designated sites of ecological importance, such as SSSIs. Nature and wildlife reserves in local areas may not have statutory status but the Government recognises they can be sites of local importance. The Government considers that impacts upon local sites are more appropriately addressed by the IPC at the development consent

stage when Environmental Impact Assessments are undertaken and project level information is available.

Assessment

C.4.71 The Government notes that the Appraisal of Sustainability has identified potential impacts on nationally designated sites of ecological importance which it considers of strategic significance. Given the scope for mitigation of biodiversity effects identified in the Appraisal of Sustainability for sites of national importance it is reasonable to conclude that it may be possible to avoid or mitigate impacts.

C.4.72 The Government recognises that whilst it is reasonable to reach this conclusion, there is a risk that there could be remaining effects on nationally designated sites. However, there is a need to ensure sufficient sites are available for development to meet the Government's energy policy objectives, as described in Part 2 of this NPS. In view of this and in view of the limited number of potentially suitable sites, the Government does not think the issues in relation to this criterion are sufficient to justify not including the site in this NPS. The Government has also noted the fact that there will be further detailed assessment of any proposal for the site at project level.

C.4.73 This site passes this criterion.

Policy notes

C.4.74 See the relevant guidance in EN-1, including that on the Environmental Statement and biodiversity and geological conservation. See the relevant guidance in Part 3 of this NPS, including that on biodiversity and geological conservation.

C.4.75 The IPC should also refer to the Appraisal of Sustainability for Heysham and consider whether the applicant's proposals have sufficiently taken into account the issues identified, where they are still relevant.

D8: Areas of amenity, cultural heritage and landscape value

Analysis

C.4.76 The Appraisal of Sustainability identified potential adverse visual effects on landscape. These include lasting adverse indirect landscape and visual impacts on the surrounding area, the Lake District National Park and two Area of Outstanding Natural Beauty (AONB) designations – the Arnside and Silverdale and the Forest of Bowland Areas of Outstanding Natural Beauty. The Lake District National Park is approximately 18.45km from the nominated site. The Arnsdale and Silverdale AONB is approximately 10.7km from the nominated site. The Bowland Forest AONB is approximately 10km from the nominated site.

C.4.77 The Appraisal of Sustainability has found that whilst the impact on the Lake District National Park and AONBs could not be entirely mitigated, the nominated site is adjacent to an existing nuclear power station, in an area that is already heavily industrialised, and so the additional impact on the landscape would be less significant at a regional level.

C.4.78 The Appraisal of Sustainability has not identified any amenity, cultural heritage, or landscape designations within the nominated site boundary, though a prehistoric artefact was found in the area. The Appraisal of Sustainability finds that there is the potential for adverse effects on local cultural heritage features, but these are unlikely to be considered as being of national strategic significance and further detailed assessment at project level would be required. These impacts arise because depending on the distance and sight lines (and mitigation applied) a new nuclear power station could detrimentally impact the setting of any scheduled monuments, conservation areas, and listed buildings that are identified in the region.

C.4.79 The Appendices of the Appraisal of Sustainability for Heysham lists those sites that could be affected depending on distance, sight lines and potential for mitigation including the nearest scheduled monuments of the High Cross in St. Peter's Churchyard in Heysham and St. Patrick's Early Christian Chapel which both lie within an approximate distance of 2km of the site; Grade I and 3 Grade II listed buildings within an approximate distance of 5km of the site; 6 conservation areas within an approximate distance of 5km of the site; no listed buildings within or adjacent to the site, but 82 Grade II listed buildings within an approximate distance of 5km.

C.4.80 Concern was raised about the coastline around Heysham Head, a rare example in the North West of England of a coastal cliff, and the National Trust's provision of public access to this part of the coastline. There was also concern that there had been no consideration of potential impacts upon the Scheduled Ancient Monument located at Heysham Head and its wider setting.

C.4.81 With regard to the Scheduled Ancient Monument at Heysham Head (St. Patrick's Early Christian Chapel), this is identified in the appendices to the Appraisal of Sustainability site report for Heysham. It is approximately 2km away. The Appraisal of Sustainability considered impacts to be unlikely to be of national strategic significance and to be likely to be seen within the context of the existing power station. However, as the exact nature of any potential effects is unknown at this stage, they would be more appropriately assessed at project level.

C.4.82 The Appraisal of Sustainability also finds the potential for long term potential adverse effects on the low sandstone cliffs adjacent to the nominated site should cooling culverts be routed through them. Further detailed assessment at project level would be required to ensure that attempts be made to minimise any adverse effects.

C.4.83 EN-1 sets out that in considering the impact of a proposed development on maintaining coastal recreation sites and features, the IPC will expect applicants to have taken advantage of opportunities to maintain and enhance access to the coast. Should the National Trust be affected, it would be expected that the developer discussed proposals with them.

Assessment

C.4.84 In making this assessment the Government has had regard to the purposes of the designation of the National Park in conserving and enhancing the natural beauty, wildlife and cultural heritage of the park and promoting opportunities for the understanding and enjoyment of the special qualities of those areas by the public. It has also had regard to the purposes of the AONBs, which is of conserving and enhancing the natural beauty of the area of outstanding natural beauty.

C.4.85 The nominator of the site has proposed potential mitigating actions to minimise impacts on the National Park. However, the Appraisal of Sustainability has assessed that visual impacts will be highly likely given the existing undeveloped nature of the nominated site, the scale of new development and the potential need for associated off-site grid connection infrastructure.

C.4.86 The potential for remaining effects can only be fully assessed when detailed plans come forward. This is because they depend on a range of factors including the proposals for minimisation and mitigation, the cooling technology proposed and location of transmission infrastructure, and the relevant other development in the area to be factored when considering cumulative effects at the development consent stage.

C.4.87 The Government believes that in relation to this criterion, the site is potentially suitable despite the potential impacts. This takes into account the fact that the nature, scope, and scale of any effect is currently uncertain and is dependent on the exact form of development proposed; that there is some scope for a developer and the IPC to explore in detail minimisation, avoidance and mitigation of adverse effects; there is a need for sites to be available for potential new nuclear power stations as outlined in Part 2 of this NPS; and in particular the distance to the designated sites and the context of the site (next to existing facilities).

C.4.88 The Government notes that some visual impacts may remain on the settings of cultural heritage features in the area depending on distances and sight lines. Impact and mitigation measures will need to be considered by the IPC, but at this stage the potential effects are not felt sufficient to outweigh the need for sites as set out in Part 2 of this NPS, particularly given the need for further investigation and the scope for some mitigation that has been identified by the Appraisal of Sustainability.

Policy notes

C.4.89 See the relevant guidance in EN-1 and Part 3 of this NPS, including that on landscape and visual impacts. The IPC should also refer to the Appraisal of Sustainability and the applicant's proposals for Heysham and consider whether the applicant's proposals sufficiently avoid or mitigate potential impacts where they are still relevant.

D9: Size of site to accommodate operation

Analysis

C.4.90 The Government has stipulated against criterion C1: Demographics that the nominated site is only suitable on the proviso that the elements of a power station which have the direct potential to cause radiological hazard are housed in the area which does not exceed the semi-urban criterion, which comprises of 32 hectares. Because the remainder of the site could be used for other purposes, such as ancillary buildings, it could also be used to provide defence-in-depth for the nuclear facility. The Office for Nuclear Regulation has therefore considered the full nominated boundary when making their assessment on defence-in-depth.

C.4.91 The nominated area is approx 115 hectares. It has a public road and a number of tracks/footpaths bisecting it. It is a security requirement that the licence applicant has exclusive rights of access to, and control of, a civil licensed nuclear site and that it is not therefore bisected by any public rights of way.

C.4.92 The Office for Nuclear Regulation has advised that there appears to be insufficient land to provide effective defence-in-depth for a nuclear reactor, including the associated turbine hall, spent fuel and intermediate level waste stores (see the map at the end of this annex):

- east of a line drawn between grid references 304045.45983 and 34052.46002, as the land is of inadequate width; and
- west of the public road, as the land is of inadequate width unless the road is realigned or closed.

C.4.93 The Office for Nuclear Regulation has advised that this land could be used for locating supporting infrastructure that has no potential to directly cause a radiological hazard. Whilst these particular areas have insufficient land to provide defence-in-depth, the Office for Nuclear Regulation has confirmed that there is sufficient area within the nominated boundary to provide sufficient defence-in-depth for essential infrastructure.

Assessment

C.4.94 Although there is an area which has been identified by the Office for Nuclear Regulation as having insufficient land for the effective defence-in-depth for a nuclear reactor (including its associated turbine hall, spent fuel and intermediate level waste stores), based on the advice of the Office for Nuclear Regulation, it is reasonable to conclude that there is enough land within the boundary nominated to safely and securely operate at least one new nuclear power station, including the safe and secure storage of all the spent fuel and intermediate level waste produced through operation, and from decommissioning, on the site of the station until it can be sent for disposal in a geological disposal facility.

C.4.95 Given the size of the site it is reasonable to conclude that there may be scope for mitigation of any concerns over tracks and footpaths crossing the site, such as siting the station away from these areas or realigning them where necessary.

Policy notes

C.4.96 The safety and security of a nuclear power station is considered by the Office for Nuclear Regulation as part of the licensing regime. See Part 3 of this NPS for guidance on the relationship between the regulatory framework and the planning regime.

C.4.97 Part 4 of EN-1 (Socio-economic) advises that an application should have taken into account the location of public rights of way, including footpaths, bridleways and byways and minimised hindrance to them where possible.

D10: Access to suitable sources of cooling

Analysis

C.4.98 The nomination outlines a number of potential cooling technologies. It expresses a preference for direct cooling from the sea. The advice of the Environment Agency indicates that there appears to be access to potentially suitable sources of cooling at the site.

C.4.99 Although there are currently discharges from the existing Heysham power stations, the Appraisal of Sustainability for Heysham notes that the return of cooling water from a new power station to the coastal waters at Morecambe Bay at elevated temperatures has the potential to cause failures to existing water quality standards. However, the Environment Agency has also advised that any potential impacts would be assessed during detailed design and considered in any application for a consent to make discharges. This would require the discharges to meet regulatory

standards for the protection of the quality of estuarine or coastal waters in line with future requirements of the Water Framework Directive[107].

C.4.100 The Environment Agency has noted that there are important nursery grounds for both bass and sole on this coast as well as large populations of migratory salmonids. Morecambe Bay is large, inter-tidal and for the most part shallow. Responses reflected concerns that it could be adversely affected by thermal discharge. The Environment Agency has also advised that this area is particularly sensitive to elevated temperatures associated with climate change. Morecambe Bay carries important nature conservation designations. Migratory cold water fish species such as salmon and sea trout are particularly vulnerable. Any development in this area would need to take into account the existing power station cooling discharges and any potential overlap with new development.

Assessment

C.4.101 Based on the findings of the Appraisal of Sustainability and the Environment Agency it is reasonable to conclude that there is access to suitable sources of cooling at the site. The site passes this criterion. Detailed modelling as part of the licensing process will give greater clarity about the acceptability of impacts in the light of the cooling technology that is proposed.

Policy notes

C.4.102 See the relevant guidance in EN-1, including Section 5.3 on biodiversity and Section 5.5 on coastal change, given that a new development may require offshore infrastructure for intake and outfall.

C.4.103 See the relevant guidance in Part 3 of this NPS, including that on water quality and resources.

C.4.104 See Part 3 of this NPS for guidance on the relationship between the regulatory framework and the planning regime.

Appraisal of Sustainability and Habitats Regulations Assessment for Heysham

C.4.105 The Planning Act 2008[108] requires an Appraisal of Sustainability to be carried out for all NPSs. The purpose of an Appraisal of Sustainability is to consider the social, economic and environmental impacts of the policy and to suggest possibilities for improving the sustainability of the NPS. The

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107 The Water Framework Directive: European Directive 2000/60/EC establishing a framework for Community action in the field of water policy

108 The Planning Act 2008

purpose of the Appraisal of Sustainability for Heysham is to examine the potential positive and negative effects of the nominated site, identify the significance of these effects, and suggest any mitigation possibilities.

C.4.106 The NPS has also been assessed in accordance with the European Habitats Directive. That assessment (the "Habitats Regulations Assessment") tests whether a plan or project could have an adverse effect on the integrity of European Sites of nature conservation importance. A Habitats Regulations Assessment was carried out on the Heysham site.

C.4.107 The key findings of the Heysham Appraisal of Sustainability and Habitats Regulations Assessment highlight areas of significance on, amongst other things:

i) potential negative effects on three national and internationally protected conservation sites, namely Morecambe Bay SAC,SPA and Ramsar and the Lune Estuary SSSI and Leighton Moss SPA;

ii) effects on water quality and quantity in the region due to the abstraction and release of sea water for cooling;

iii) the potential need to upgrade river and coastal flood defence schemes that already exist in the area of the site;

iv) negative visual impacts on the landscape which could potentially be seen from parts of the Lake District National Park;

v) positive effects of regional economic significance may occur when the project is considered cumulatively with other projects in the North West. The Heysham site is adjacent to an existing rail link and sea port, which presents opportunities for sustainable transport, particularly during construction.

C.4.108 Key findings i) – iv) are discussed in the assessment against criteria above. Cumulative effects are discussed below.

Cumulative effects

C.4.109 Heysham is approximately 60km south east of the nominated site at Sellafield in Cumbria. Potential cumulative effects could arise as a result of interactions between the sites due to their relative proximity and the way in which effects may act together. Cumulative effects may also occur in relation to existing facilities, such as the existing nuclear power stations at Heysham and the nuclear facilities at Sellafield.

Biodiversity and ecosystems

C.4.110 The site Appraisal of Sustainability report for Heysham identifies that the potential for major adverse effects on sites and species considered of UK-wide and European nature conservation importance means that strategic

significant effects on biodiversity cannot be ruled out. The effectiveness of mitigation possibilities is uncertain and needs to be evaluated in the project level assessments. No common sites of European nature conservation importance are assessed as being potentially affected by both power stations. However, the Appraisal of Sustainability found that there may be significant adverse effects on wider biodiversity if both Heysham and Sellafield are developed due to the prevalence of nationally designated sites at both Sellafield and Heysham sharing similar habitats or species, meaning that there is a chance that if both sites were developed and impacted on similar sites a cumulative effect could arise.

Effects on communities: population, employment and viability.

C.4.111 Development at the Heysham site is appraised as having positive effects of regional economic significance on employment and community viability. The Appraisal of Sustainability identified that there are indirect positive health effects associated with enhanced prosperity and long-term employment opportunities.

C.4.112 The cumulative positive effects of employment, community viability and health/well-being could be more significant if more than one new nuclear power station is built and the opportunities for upskilling, education, and supporting industries to the nuclear sector are developed at local and regional levels. The site Appraisal of Sustainability report notes that there may be negative effects, during the construction of any new power stations, if the development produces a local shortage of specialist construction labour. This negative effect could be increased if more than one power station is developed in the region. However, these effects may be mitigated if the education and upskilling opportunities noted above are taken and by appropriate phasing of construction.

Other aspects

C.4.113 The Appraisal of Sustainability finds that there are beneficial cumulative effects on climate change from the NPS and that these are likely to contribute to emission targets at the international and national scales, but are unlikely to be significant at the regional scale.

Conclusion on cumulative effects

C.4.114 If nuclear power stations are developed at more than one site in the region, any cumulative radiological effects would be addressed by risk assessments as part of the site licensing process.

C.4.115 Interactions between potential developments can be complex and will depend on what relevant proposals have come forward. This can only be properly assessed at the point at which an application for development consent is made.

C.4.116 Paragraph 4.2.1. of EN-1 sets out that when considering cumulative effects, the Environmental Statement that accompanies an application 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 or granted, as well as those already in existence) [109].

Other issues raised during the assessment

C.4.117 This section deals with other common issues at this site that were raised in responses.

Health

C.4.118 The Appraisal of Sustainability for Heysham has considered strategic effects on human health and well being. The Appraisal of Sustainability looks at a range of different factors and should be referred to for a more in depth assessment.

C.4.119 The Appraisal of Sustainability has found that the rigorous system of regulation of routine discharges from any new nuclear power station at Heysham should ensure that there are no unacceptable risks to the health of the local population under normal operating conditions.

C.4.120 The Appraisal of Sustainability also concludes that there is a very small risk of adverse health impacts arising from an accidental release of radiation but the multiple safety features within modern nuclear plants makes such an event exceedingly unlikely. Section 3.13 of this NPS (Human health and wellbeing) sets out that the risk of an accident resulting in exposure to radiation for workers, the public and the environment is very small because of the UK's strict regulatory regime. Section 3.13 should be referred to for further guidance.

C.4.121 It is possible that the presence of a nuclear power station may lead to increased stress levels in certain individuals. Overall, the Appraisal of Sustainability finds that likely enhancement in employment, community wealth, housing stock and other associated neighbourhood infrastructure should improve community well-being and health generally.

C.4.122 Responses were particularly concerned about whether there were links between nuclear power stations and cancer. This has been the subject of the work of the Committee on Medical Aspects of Radiation in the

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109 For guidance on the assessment of cumulative effects, see, for example, Circular 02/99, *Environmental impact assessment*; or *Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions*: http://ec.europa.eu/environment/eia/eia-studies-and-reports/guidel.pdf.

Environment (COMARE)[110]. Its view is that there is no evidence for unusual aggregations of childhood cancers in populations living near nuclear power stations in the UK.

C.4.123 COMARE's tenth report considered the incidence of childhood cancer around nuclear installations. These were divided into nuclear power generating stations and other nuclear installations. The results for the power generating stations supported the conclusion that 'there is no evidence from this very large study that living within 25km of a nuclear generating site in Britain is associated with an increased risk of childhood cancer'.

C.4.124 In its eleventh report COMARE examined the general pattern of childhood leukaemia within Great Britain and concluded that 'the search for increased risk levels near to nuclear power generation sites shows no pattern of excess cases of childhood cancer close to the sites of these types of nuclear installations' Among its recommendations, the report said that the incidence of childhood leukaemia and other cancers in the vicinity of Sellafield and Dounreay, which are not power generating stations, was raised and should be kept under surveillance and periodic review.

C.4.125 Responses raised particular concerns about the findings of the KiKK study[111] undertaken in Germany. Following the publication of the KiKK study, COMARE requested that a reanalysis of the UK childhood cancer data used in COMARE's tenth report be carried out using the same methodology as the KiKK study as far as was possible. This reanalysis – the Bithell paper[112] – was published in December 2008. It showed that, for the UK, the conclusions of the COMARE tenth report remained valid when applying methodology closer to that of the KiKK study on the same dataset. The tenth report did however state that for other nuclear sites the situation was more complicated. The study did demonstrate corresponding results to

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110 COMARE is an independent scientific advisory committee providing advice on all aspects of health risk to humans exposed to natural and man-made radiation. It has, for over twenty years, investigated the incidence of childhood cancer and other cancers around nuclear sites. All reports can be found at http://www.comare.org.uk/

111 The results of the Kinderkrebs in der Umgebung von Kernkraftwerken (KiKK) study of childhood cancer in the vicinity of German nuclear power plants between 1980 and 2003 was published in 2008 by the German Childhood Cancer Registry (DKKR), based on data from and designed in consultation with the Federal Office for Radiation Protection (BfS). The KiKK study found that there was a correlation between the distance of the home from the nearest nuclear power station at the time of diagnosis and the risk of developing leukaemia before the fifth birthday. However, it also noted that the exposure to ionising radiation in the vicinity of German nuclear power stations was lower by a factor of 1,000 to 100,000 than the exposure to natural background and medical radiation, and that therefore the findings of the study could not be explained in the present state of radiobiologic and epidemiologic knowledge

112 Bithell et al, Radiation Protection Dosimetry 2008 132(2), Childhood leukaemia near British nuclear installations: methodological issues and recent results, pp191-197: http://rpd.oxfordjournals.org/cgi/content/abstract/132/2/191

previously published studies that showed excesses of some types of childhood cancer. These results (excess childhood cancers in Seascale near Sellafield; in Thurso near Dounreay and around Aldermaston, Burghfield and Harwell) have been extensively discussed in previous COMARE reports.

C.4.126 In May 2011 COMARE published as its 14th report a further review of the incidence of childhood cancer around nuclear power stations, with particular reference to the KiKK study and COMARE's 10th and 11th reports. In this 14th report, COMARE found no reason to change its previous advice that there is no evidence to support the view that there is an increased risk of childhood leukaemia and other cancers in the vicinity of nuclear power stations due to radiation effects. COMARE also recommends that the Government keep a watching brief in this area.

C.4.127 Radioactive monitoring carried out in 2009 found generally low concentrations of artificial radionuclides in water, sediment and beach samples and in meat and seafood samples taken around the existing Heysham nuclear power stations. From this sampling, the estimated total annual dose to the public from all sources within the Heysham area was assessed as being less than 5% of the dose limit for members of the public of 1mSv per year as specified in the Ionising Radiations Regulations 1999[113]..

Seismic risk

C.4.128 Responses were received raising concern about the seismic risk to the nominated site at Heysham.

C.4.129 As outlined in the Government response to the SSA Criteria consultation the Office for Nuclear Regulation has advised that seismic risk is more appropriately assessed at site licensing stage when detailed site specific and reactor design information is available. Seismic hazard was therefore identified as an SSA criteria which is flagged for local consideration[114]. This will be done by the Office for Nuclear Regulation as part of licensing. In order to satisfy the regulators that site licence conditions will be met, the designers of the plant will need to demonstrate that the installed plant is able to withstand all site-specific natural hazards including earthquake, flooding or meteorological conditions. The reactor designs being considered under the Generic Design Assessment process are intended for worldwide application, with baseline seismic resistance designs in the area

113 Environment Agency , *Radioactivity In Food and the Environment* 2009(RIFE 15) report, 2010. This monitoring is conducted annually and can be found at http://www.environment-agency.gov.uk/homeandleisure/110353.aspx

114 Flags for Local Consideration are siting criteria that were identified through the SSA consultation in 2008, but which (usually due to the need for detailed site-specific investigations and data) would be more appropriately assessed at the project level.

of 0.25g-0.5g peak ground acceleration. This does not therefore affect the potential suitability of the site as part of the SSA.

Existing land use

C.4.130 The nominated area includes part of Ocean Edge Leisure Park and Heysham Golf Course, potentially leading to loss of local amenities. Responses questioned whether Heysham Golf Course should be included within the definition of amenities used in the SSA. It is assumed that this refers to Criterion D8. There were also concerns on the impact on business at Ocean Edge Leisure Park, which sells caravans and lodges as holiday homes to private owners and letting of caravans for holiday accommodation.

C.4.131 The SSA required nominators to supply site boundaries rather than a general location. This was to reduce uncertainty within communities about exactly where a new power station might go. Existing land use and ownership was not a key consideration in the SSA. This was because it is possible, although not inevitable, that land use and ownership could change between now and 2025. However if nominators were considering nominating land that they did not own, they had to notify the landowner so that the nomination did not come as a surprise and they could feed in their views. Actual requirements for land-use will depend on the eventual choice of technology and the approach to construction.

C.4.132 Continued dialogue and engagement between nominators and landowners remains important as actual requirements for land-use will depend on the eventual choice of technology and the approach to construction, and may only be determined at a later date.

C.4.133 Should an application for development consent come forward that impacts on existing land use, the guidance in Part 3 of EN-1 on Land Use including Open Space, Green infrastructure and Green belt would be relevant.

Conclusion on the nominated site at Heysham

C.4.134 Given that the site meets the SSA criteria, and having considered the evidence from, inter alia, the public, regulators, the Appraisal of Sustainability and Habitats Regulations Assessment site reports, the Government has concluded that the site is potentially suitable and should be in this NPS.

C.4.135 This assessment has outlined that there are a number of areas which will require further consideration by the applicant, the IPC or the regulators, should an application for development consent come forward, including amongst other things the impact of this proposal in combination with any other relevant nuclear power stations in the region, including the cumulative effects with other nominated sites as relevant, the demographic profile of the area and the effects on biodiversity including the impact of

cooling. However, the Government has concluded that none of these factors is sufficient to prevent the site from being considered as potentially suitable.

C.5 Hinkley Point

Description of the site

C.5.1 The nominated site is located adjacent and to the west of Hinkley Point A nuclear power station on a rocky headland on the Somerset coast. The site is within the civil parish of Stogursey, the District of West Somerset and the county of Somerset. The grid reference of the approximate centre of the nominated site is 320300, 145850. The nominated site includes land to the south of Hinkley Point A power station which the nominator[115] indicated may be needed to accommodate ancillary features to meet operational requirements. A map is provided at the end of this annex.

C.5.2 The existing Hinkley Point nuclear power station, Hinkley Point B, is a twin-reactor Advanced Gas-Cooled (AGR) power station which commenced operation in 1976 and is currently expected to operate until 2016.

C.5.3 EDF have carried out consultations on their detailed plans for development at Hinkley Point[116]. Because of this, responses were received to the Government consultation regarding the content of EDF's consultations, including associated infrastructure, worker accommodation and construction arrangements. Whilst these points are noted at paragraph C.6.107, the Strategic Siting Assessment (SSA) is a strategic assessment of the suitability of a site and it has not considered detailed developer proposals. Such proposals may not affect the site's overall strategic suitability and the Government believes that the Infrastructure Planning Commission (IPC) or its successor is best placed to consider them. The IPC will decide the application in accordance with this NPS and EN-1, which gives guidance on the consideration of the impacts of a development.

Deployability by the end of 2025

C.5.4 The SSA considered whether sites are credible for deployment by the end of 2025[117]. This is because it is important to focus on sites which can come on stream in good time to contribute to the Government's objectives on climate change and energy security.

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115 Hinkley Point was nominated by EDF.

116 15 December 2009 to 18 January 2010 - Stage 1, Consultation on 'Initial Proposals and Options', 9 July 2010 to 4 October 2010 - Stage 2, Consultation on 'Preferred Proposals', 25 February to 28 March 2011 - Stage 2 Update, Consultation on 'Update on and Proposed Changes to the Preferred Proposals'.

117 For the purposes of this NPS, "deployment" means commencing operation of one or more new nuclear power stations on the site.

C.5.5 A grid connection agreement is in place for a transmission capacity of 1670 MW from 2017, increasing to 3340 MW from 2018. National Grid has undertaken a consultation on route corridors, a second phase of which ended in July 2010. As noted above, EDF has also progressed consultations on their development proposals.

C.5.6 The Government is satisfied from the information provided by nominators and an independent assessment that at the point of publication, Hinkley Point is credible for deployment by the end of 2025 regardless of whether the site is deployed by that date.

Assessment of suitability against SSA criteria

C1: Demographics

Analysis

C.5.7 The Office for Nuclear Regulation has advised that the site does not exceed the semi-urban criterion. Responses raised that the site is near centres of population such as Taunton, Bridgwater, Bristol, Burnham on Sea and Weston-super-Mare and that the area is more densely populated than when the original station was built.

Assessment

C.5.8 Based on the advice of the Office for Nuclear Regulation this site passes the demographics criterion. In analysing this criterion the Office for Nuclear Regulation's generic demographic analysis[118] was carried out to a radius of 30km from the nominated site and takes into account population centres out to that distance.

C.5.9 The Office for Nuclear Regulation's assessment is based on data from the National Population Database 2, updated in 2008, and therefore takes into account changes in populations since development of the existing power station. This site passes the demographics criterion.

Policy notes

C.5.10 See Section 3.6 of this NPS on flags for local consideration[119].

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118 http://www.hse.gov.uk/landuseplanning/land-use-planning.pdf

119 Flags for Local Consideration are siting criteria that were identified through the SSA consultation in 2008, but which (usually due to the need for detailed site-specific investigations and data) would be more appropriately assessed at the project level.

C2 and D5: Proximity to military activities

Analysis

C.5.11 The Ministry of Defence has advised that the site identified does not occupy any Ministry of Defence statutory safeguarding zones protecting aerodromes, explosive storage sites, technical sites or ranges and it is not within 1000 metres of any Ministry of Defence Danger Areas. No military firing activity occurs in the marine or landward areas adjoining the site. There are no military explosive or military nuclear facilities within 1000 metres of the site. The Ministry of Defence has found that it is reasonable to conclude, at a strategic level, that any likely power station development within the site boundary can be protected against the risk of external hazards created by neighbouring military activities throughout its lifetime[120]. The Office for Nuclear Regulation has agreed with this advice.

C.5.12 Given the proximity to military facilities the Ministry of Defence has also advised that it is potentially reasonable to conclude, at a strategic level, that any likely power station development within the nominated site boundary will not adversely affect the capabilities of the armed forces to carry out essential training and operations throughout its lifetime. The Restricted Area that encompasses the existing Hinkley Point nuclear power station (EG R153) overlaps with the Ministry of Defence Danger Area Restricted Area that contains the Bridgwater Bay Firing Area (EG D119). The site identified for a new nuclear power station is west of the existing facility and as such a new Restricted Area (or expansion of EG R153) would extend further across EG D119. This could inhibit access for aircraft using the Ministry of Defence Danger Area. The Ministry of Defence has advised that with respect to the existing EG R153 an exception is in place permitting helicopters flying to or from EG D119 to pass through EG R153 subject to the permission of the person in charge at Hinkley Point, with all aircraft movements remaining 1 nautical mile from the centre point of the exclusion zone. There is potential for a similar exemption for the nominated site.

C.5.13 It is anticipated that any new Restricted Area established to protect this facility has the potential to afford sufficient separation of such aircraft movements from any tall structures that may be built at the site. However, the Ministry of Defence would wish to be consulted on the siting and design of a power station at this location to verify whether air navigation warning lights are considered necessary. The security of civil nuclear material and sites in the UK is regulated by the Office for Nuclear Regulation in

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120 See entry D2 in the table “The SSA criteria and how the sites were assessed” at the end of this Annex for details on the potential lifetime of the site and the period this assessment covers.

accordance with relevant national legislation, which fully reflects international obligations and guidelines.

C.5.14 Responses highlighted the proximity of Lilstock, which is part of the Bridgwater Bay Firing Area, and that military aircraft fly in this area. The Ministry of Defence has advised that whilst military aircraft conduct air to surface gunnery practice offshore in Bridgwater Bay to the north west of the site identified, the offshore area in which firing is contained is remote from the shore and as such there is no direct hazard from this military activity. There were some concerns that military aircraft could be used by terrorists to attack a nuclear power station and that the proximity of Lilstock could exacerbate this.

C.5.15 The Office for Nuclear Regulation and the Environment Agency are currently undertaking a process of Generic Design Assessment (GDA) of new nuclear reactor designs. GDA allows the generic safety, security and environmental implications of new nuclear reactor designs to be assessed up front. The GDA process takes into account all reasonably foreseeable external threats. This includes meteorological phenomena, the effects of climate and landscape change, geological disturbance, seismic activity, flooding and aircraft impact.

Assessment

C.5.16 Based on the advice of the Office for Nuclear Regulation and the Ministry of Defence it is reasonable to conclude that:

- the site does not occupy any Ministry of Defence areas which would give rise to the site being excluded from assessment;
- the site is not in proximity to any Ministry of Defence assets or activities that would suggest that it should be ruled out;
- any likely power station development within the site boundary can be protected against the risk of external hazards created by neighbouring military activities throughout its lifetime; and
- based on the advice of the Ministry of Defence it is reasonable to conclude that the development of a new nuclear power station at the site will not affect the capabilities of the armed forces to carry out essential training and operations throughout its lifetime.

C.5.17 It appears possible that the impacts on Ministry of Defence Danger Area Restricted Area that contains the Bridgwater Bay Firing Area (EG D119) could be mitigated without compromising the safety of any new installation, as is currently the case with the existing station. The applicant would need to consider this issue in greater detail with reference to the Ministry of Defence and Office for Nuclear Regulation should an application for development consent come forward. This site passes these criteria.

Policy notes

C.5.18 See Section 5.4 of EN-1 on Civil and Military Aviation and Defence Interests.

D1: Flooding, storm surge and tsunami

Analysis

Flood Zones

C.5.19 A significant part of the site is in Flood Zone 1, although part of the site is within Flood Zone 3. Flood Zone 1 comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%). Flood Zone 3 comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year[121].

C.5.20 Some responses felt that because part of the site is in Flood Zone 3, it must be unsuitable for development. The Government believes that the fact that a site, or in this case, part of a site, is in Flood Zone 3 should not prevent it from being considered potentially suitable if the independent regulator has advised that the site can potentially be protected. At Hinkley Point the Environment Agency and the Office for Nuclear Regulation have advised that the site can potentially be protected from flood risk, including the effects of climate change, throughout its lifetime (see below).

C.5.21 In addition to considering the availability of other sites in lower flood zones, the Government has taken a sequential approach which involves giving priority to areas at lower risk of flooding[122].

As well as submitting a flood risk assessment in accordance with Section 5.7 of EN-1, this NPS also sets out that the IPC will still need to be satisfied that a sequential approach has been applied at the site level to ensure that, where possible, critical infrastructure is located in the lowest flood risk areas within the site.

Sea level rise and the effects of climate change

C.5.22 The Appraisal of Sustainability[123] identified potential adverse effects on flood risk, due to rising sea levels, especially during the later stages of

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121 See *Planning Policy Statement 25: Development and Flood Risk* (PPS25), July 2001, pp 22 – 25, for a definition of the Flood Zones and what they cover: http://www.communities.gov.uk/documents/planningandbuilding/pdf/planningpolicystatement25.pdf,

122 See Section 3.7 of this NPS for more detail

123 DECC, *Appraisal of Sustainability: site report for Hinkley Point*, October 2010, www.energynpsconsultation.decc.gov.uk

operation and decommissioning of any new nuclear power station. The Appraisal of Sustainability finds that mitigation against flooding may be possible through appropriate design and construction of defences and sustainable management.

C.5.23 Some responses were concerned that climate change could cause more intense storm surges and increased risk of flooding in the future given the long timescales that waste could be on site. Waste will be stored in safe and secure interim storage facilities until a geological disposal facility becomes available. It is currently anticipated that disposal of new build wastes would begin once disposal of legacy wastes is completed. Geological disposal of higher activity waste from new nuclear power stations is currently expected to be available for new build waste from around 2130[124].

C.5.24 The Government has been advised by the Environment Agency and the Office for Nuclear Regulation on this criterion. This advice was based on a consideration of the capacity of nominated sites to withstand flood risk and coastal erosion including the potential effects of climate change using modelling data that looks ahead to 2100. Predictions of potential climate change effects become increasingly less certain the further into the future that they extend. However, climate change projections will continue to be refined and, as time passes, will project further into the future. As such, should greater future impact be predicted, this should be identified well in advance, giving time for appropriate actions to be taken to address those impacts.

C.5.25 The regulators have also examined the adaptability of the sites to potential changes in flood hazard and are satisfied that additional safeguards are in place to ensure that only suitable sites achieve development and ongoing operational consent. This will also be reviewed in more detail as part of the planning and licensing stage and as part of the Flood Risk Assessment that applicants must undertake in conjunction with their applications to the IPC.

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124 On the assumption that spent fuel will be stored on-site until it can be disposed of, the key factors in determining the duration of on-site storage are the availability of a geological disposal facility (GDF) and the time required for the spent fuel to cool sufficiently for disposal in a GDF. The Nuclear Decommissioning Authority (NDA's) current indicative timetable anticipates a GDF being available to take spent fuel from new nuclear power stations from around 2130, although the future optimisation of plans for the implementation of geological disposal and the expected inventory for disposal indications may provide potential to bring forward this date. Optimisation work will also explore options for reducing the cooling time required for spent fuel prior to disposal. The Government will expect operators to ensure their waste is disposable when a GDF is anticipated to be available to take the waste. See Section B.4 of this NPS for more detail. An indicative timeline for Geological Disposal can be found at http://www.decc.gov.uk/assets/decc/What%20we%20do/UK%20energy%20supply/Energy%20mix/Nuclear/geological-disposal-board/982-geological-disposal-timeline.pdf

C.5.26 Should sites achieve development consent, their capacity to withstand potential climate change will remain under consideration throughout the life of the nuclear power station. Once licensed, as part of the site licensing conditions, the licensee must review their safety case at regular intervals (typically on a ten yearly basis). This review will take the most recent climate change projections into account and allow the necessary modifications to flood defences and/or operating arrangements to be undertaken. The objective of the review is to compare the safety case of the site against modern standards to see if there are reasonably practicable improvements that could be made, to ensure that the plant is safe to continue to operate, including spent fuel and radioactive waste storage for the next defined period.

Other points

C.5.27 Some responses concerned the tidal range of the Bristol Channel, and the threat posed by climate change and storm surge. Some responses raised concerns about the flooding events of 1607 around the Bristol Channel which some responses described as a "tsunami". The 2005 DEFRA report entitled "The threat posed by tsunami to the UK" examined this event and found that "in this case, the combination of a high tide and a storm surge at the time provides a likely explanation for the flooding" [125]. The report suggests that, for most credible scenarios, wave heights produced at the coast by tsunami-type events are unlikely to exceed those anticipated for major storm surges. All major centres of development on coasts and estuaries have defences that are designed to withstand such surge waves. The 1607 flooding is part of the historical record and information from scenarios such as this can help to decide levels of flood protection needed. It is worth noting that the regulatory requirement is for sites to be safe against what is likely to be a more severe event, a 1 in 10,000 year flooding event.

C.5.28 The Environment Agency has advised that it is reasonable to conclude that any new nuclear power station on the site could potentially be protected against flood risk throughout its lifetime, including the potential effects of climate change, storm surge and tsunami, taking into account possible countermeasures. The Environment Agency has advised that any new defences may need to link with existing defences to ensure the defence system cannot be circumvented by tidal flooding. The Environment Agency has advised that part of the site is within a designated fluvial flood risk area and any possible adverse impacts would need to be addressed in the Flood Risk Assessment for the site, which would be undertaken as part of project level studies. The Environment Agency has advised that fluvial flooding could impede access and egress to the site, but that this hazard

125 See: http://www.defra.gov.uk/environment/flooding/documents/risk/tsunami05.pdf

could be mitigated in the design of such routes to ensure the access remains open.

C.5.29 The Environment Agency has advised that any new tidal flood mitigation measures are unlikely to have a detrimental effect on the flood risk to the surrounding area. The Environment Agency has noted for all nominated sites that protecting the site from flood risk now and in the future prevents the coastline and estuary from changing and adapting naturally.

Assessment

C.5.30 This site passes this criterion. This takes into account in particular that there is a low risk of flooding at this site (although parts of the site are in Flood Zone 3), and based on the advice of the Environment Agency and the findings of the Appraisal of Sustainability, it is reasonable to conclude that any new nuclear power station on the site could potentially be protected against flood risk throughout its lifetime, including the potential effects of climate change, storm surge and tsunami. Should any application be forthcoming, the Flood Risk Assessment would need to consider the risk of fluvial flooding to the site.

Policy notes

C.5.31 See Section 5.7 of EN-1 and Section 3.7 of this NPS on flood risk.

D2: Coastal processes

Analysis

C.5.32 Responses were received concerning coastal erosion in the local area. The Environment Agency has advised that the site could potentially be developed in a manner that could avoid or mitigate the effects of coastal erosion or other landscape change scenarios throughout its lifetime, including the potential effects of climate change.

C.5.33 There were also concerns that coastal squeeze should be considered as a conservation issue. The Habitats Regulations Assessment site report[126] has identified that coastal squeeze impacts could occur on the Severn Estuary Special Area of Conservation (SAC), Special Protection Area (SPA) and Ramsar site. The Severn Estuary Coastal Habitat Management Plan, produced by the Environment Agency, indicates that the Estuary is changing progressively. In particular sea level rise is resulting in coastal squeeze and a net loss of intertidal habitat. The Habitats Regulations Assessment notes that all supporting habitats with SPA designation are sensitive to removal by land reclamation and construction activity. It finds

126 DECC, *Habitats Regulations Assessment: site report for Hinkley Point*, October 2010, www.energynpsconsultation.decc.gov.uk

consideration should be given to site layout and land-take at an early stage.

C.5.34 The Appraisal of Sustainability identified potential adverse effects on water quality and quantity including on coastal processes, hydrodynamics and sediment transport. The Appraisal of Sustainability notes that these could arise from upgraded flood defences likely to be required to counteract coastal retreat at the nominated site. For instance, the EDF Environmental Impact Assessment scoping report[127] has identified the need for the construction of a new sea wall at Hinkley Point. The Appraisal of Sustainability finds that these defences have the potential to modify existing estuarine hydrodynamics and associated sediment movement, which may have secondary effects on estuarine and marine ecosystem structure and functioning. However, the Appraisal of Sustainability finds that the use of an appropriate design and an increased understanding of the hydrodynamics and sediment transport within the Severn Estuary could minimise the potential effects. The Appraisal of Sustainability also identifies that there are potential cumulative effects with other proposed projects in the Severn Estuary including the site proposed for a new nuclear power station at Oldbury. It also found that any potential Severn Tidal power project could impact on estuarine hydrodynamics and associated sediment movement[128]. This is discussed further under “cumulative effects”.

Assessment

C.5.35 This site passes this criterion. Based on the advice above it is reasonable to conclude that a nuclear power station at the site could be protected against coastal erosion, including the effects of climate change, for the lifetime of the site. Mitigation of effects of coastal erosion may be possible through appropriate design and construction of defences. Section 1.6.3 of this NPS sets out that coastal squeeze needs to be considered in a project level Habitats Regulations Assessment.

C.5.36 See the section on “cumulative effects” for discussion of the potential combined effects with other development in the region.

Policy notes

C.5.37 See Section 5.5 of EN-1and Section 3.9 of this NPS on coastal change.

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127 http://infrastructure.independent.gov.uk/?page_id=202

128 The Government has concluded that it does not see a strategic case for public investment in a tidal energy scheme in the Severn estuary at this time, but wishes to keep the option open for future consideration. For further details see http://www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/energy_mix/renewable/severn_tidal_power/severn_tidal_power.aspx

D3: Proximity to hazardous industrial facilities and operations

Analysis

C.5.38 Based on Office for Nuclear Regulation records the nominated site is not in the vicinity of any COMAH establishments[129]. The Office for Nuclear Regulation has advised that as with all sites, during licensing the applicant to the Office for Nuclear Regulation will also need to take account of the need for countermeasures to protect nuclear operations from any hazards and risks from any nearby notified major hazard pipelines, based on information from the relevant pipeline operators about their routes and fluids being conveyed. Responses highlighted that the new reactor would be built next to existing reactors - Hinkley A is being decommissioned and Hinkley B is still operational - and a serious accident at Hinkley B would require evacuation of any Hinkley C power station.

C.5.39 As part of any site licensing activity, the applicant would be required to demonstrate that a hazard from an adjacent facility would not pose an unacceptable risk. As part of their assessment of a proposed power station regulators consider the applicant's estimation of the threats posed to the site by nearby hazardous facilities and any proposed mitigating action.

C.5.40 In the case of adjacent (or close by) nuclear power stations, there are a number of examples in the UK where this is or has been the case for many years. As part of the site licensing process, the Office for Nuclear Regulation has advised that they would need to be satisfied that appropriate emergency arrangements can be put in place, and that it is routine for them to ensure that the emergency arrangements for adjacent nuclear sites are such that they work in a coordinated fashion. As part of any site licensing activity, the applicant would be required to demonstrate that a hazard from an adjacent facility would not pose an unacceptable risk.

Assessment

C.5.41 The site passes this criterion. It is reasonable to conclude that any likely power station development within the nominated site boundary can be protected against risk arising from proximity to hazardous facilities throughout its lifetime, taking into account possible countermeasures.

Policy notes

C.5.42 See Section 4.12 of EN-1.

C.5.43 The applicant should consult with the Local Planning Authority where appropriate.

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129 Under the Planning (Control of Major Accident Hazards) Regulations 1999. See http://www.hse.gov.uk/comah/background/comah99.htm# for more information.

D4: Proximity to civil aircraft movements

Analysis

C.5.44 The Civil Aviation Authority has advised that it is potentially reasonable to conclude that any likely power station development within the nominated site boundary can be protected against risks from civil aircraft movement. The Office for Nuclear Regulation has agreed with this advice. Nuclear power stations in the UK receive some protection from aviation activity through the establishment of a Restricted Area at each individual station. This is established by legislation[130]. Typically, such Restricted Areas have a radius of two nautical miles and extend vertically to 2000 feet above the surface. Any aviation activity within a Restricted Area is limited to that specifically permitted by the legislation. The existing Hinkley Point nuclear installation has an associated Restricted Area. The Civil Aviation Authority has advised that a Restricted Area around the nominated site (or an amendment to the existing Restricted Area) could provide a similar level of protection from civil aircraft movements. The Civil Aviation Authority has also advised that it is potentially reasonable to conclude that neighbouring aerodromes and air traffic control areas can mitigate any effects arising from the Restricted Area around the nominated nuclear power site. It is not anticipated that any new Restricted Area established in association with the proposed nuclear installation would impact upon local aerodrome operations.

C.5.45 The Civil Aviation Authority has advised that there are no other known (i.e. marked on Civil Aviation Authority approved charts or promulgated in the UK Aeronautical Information Publication) civilian landing sites in such proximity to the proposed nuclear installation that a new or amended Restricted Area would have a material impact on associated operations. The current establishment of the existing Hinkley Point Restricted Area is such that the impact of a new or amended Restricted Area (as described above) upon civil aircraft in transit through local airspace is likely to be negligible. Responses raised the risk of malicious aircraft crash by terrorists at a new power station. This has been discussed under criterion C2 and D5. It was also raised that there are examples where restricted areas have been breached at nuclear power stations.

Assessment

C.5.46 This site meets this criterion. Given the advice above it is reasonable to conclude that any likely power station development within the nominated site boundary can be protected against risks from civil aircraft movement, and that the effects on air traffic and aerodromes can be potentially mitigated. The Civil Aviation Authority are the policing authority for air

130 In accordance with Statutory Instrument 2007 No 1929 (The Air Navigation (Restriction of Flying) (Nuclear Installations) Regulations 2007).

exclusion zones. If there were a perceived aviation breach of the SI (Statutory Instrument 2007 No 1929 (The Air Navigation (Restriction of Flying) (Nuclear Installations) Regulation 2007) it would fall to the Civil Aviation Authority (and in particular Aviation Regulation Enforcement (ARE)) to investigate although the police are also able to investigate. It would be for the site operator to report perceived breaches.

Policy notes

C.5.47 See the relevant guidance in EN-1, including that on civil and military aviation and defence interests. See the relevant guidance in Part 3 of this NPS, including that on proximity to aircraft movements.

For D5 see C2

D6: Internationally designated sites of ecological importance[131]

Analysis

C.5.48 Responses raised the potential effects of development on the Severn Estuary and its European protected sites, including in combination with other developments in the Estuary. This is discussed in more detail under "cumulative effects".

C.5.49 The Appraisal of Sustainability site report[132] has identified that the potential for adverse effects on sites and species considered to be of European nature conservation importance (the Severn Estuary SAC, SPA, Ramsar) means that significant strategic effects on biodiversity cannot be ruled out at this stage of appraisal. The findings on European Sites are taken from the Habitats Regulations Assessment[133]. The Habitats Regulations Assessment concludes that at this strategic level it cannot rule out the potential for adverse effects on the integrity of five European Sites, the Severn Estuary SAC, SPA, Ramsar and the River Wye SAC and the River Usk SAC through potential impacts on water resources and quality, habitat and species loss and fragmentation/ coastal squeeze and disturbance (noise, light and visual). The Habitats Regulations Assessment has proposed a suite of avoidance and mitigation measures to be considered as part of any project level Habitats Regulations Assessment. At this stage, it is assessed that the effective implementation of these mitigation measures may help to address adverse effects on European Site integrity,

131 These are occasionally referred to as "European Sites", "European designated sites", or "sites of European importance". See entry D6 in the table "The SSA criteria and how the sites were assessed" at the end of this annex for details of these designations and what they cover.

132 See footnote 123

133 See footnote 126

but that more detailed project level Habitats Regulations Assessment is required in order to draw conclusions on their effectiveness.

C.5.50 The Appraisal of Sustainability has also identified potential cumulative effects with other projects in the Severn Estuary area. These are considered below under “cumulative effects”.

Assessment

C.5.51 The Government notes the scope for avoidance and mitigation identified in the Habitats Regulations Assessment, and the need for more detailed studies should an application for development consent come forward. Given that the Habitats Regulations Assessment has not been able to rule out adverse impacts on sites of European nature conservation importance, the Government has carefully considered whether it is appropriate to include this site in this NPS. Annex A of this NPS sets out that the Government has concluded that there is an Imperative Reason of Overriding Public Interest that favours the inclusion of this site in the Nuclear NPS despite the inability to rule out adverse effects on European Sites at this stage. This takes into account the need for sites to be available for potential deployment by the end of 2025, the lack of alternatives, and the consideration given to compensatory measures. This site therefore passes this criterion.

Policy notes

C.5.52 See the relevant guidance in EN-1, including that on the Environmental Statement, Habitats Regulations Assessment and biodiversity and geological conservation. See the relevant guidance in Part 3 of this NPS, including that on biodiversity and geological conservation. The IPC should also refer to the Appraisal of Sustainability and Habitats Regulations Assessment for Hinkley Point and consider whether the applicant’s proposals have sufficiently taken into account the issues identified, where they are still relevant.

D7: Nationally designated sites of ecological importance

Analysis

C.5.53 The Appraisal of Sustainability site report has identified that the potential for adverse effects on sites and species considered to be of UK nature conservation importance (including the Bridgwater Bay NNR) means that significant strategic effects on biodiversity cannot be ruled out at this stage of appraisal. The Appraisal of Sustainability identifies the following Sites of Special Scientific Interest (SSSIs) of particular concern for which significant effects may occur: Bridgwater Bay SSSI; Severn Estuary SSSI; River Wye (Lower Wye) SSSI, River Usk (Lower Usk) SSSI.

C.5.54 The Appraisal of Sustainability has found that there is, however, potential for the mitigation of biodiversity effects on sites of UK wide conservation importance, including the creation of replacement habitat. Detailed baseline studies will be required to inform the ecological assessment of the proposal. Responses concerned the impact of development on wildlife and habitats near Hinkley Point. Some responses commented on the impact of abstraction of cooling water on nationally designated sites and concerns were raised regarding the impact on local conservation sites.

C.5.55 Potential effects of cooling on ecological sites are discussed under criterion D10.

Assessment

C.5.56 The Government notes that the Appraisal of Sustainability has identified potential impacts on nationally designated sites of ecological importance which it considers of strategic significance. Given the scope for mitigation of biodiversity effects identified in the Appraisal of Sustainability for sites of national importance it is reasonable to conclude that it may be possible to avoid or mitigate impacts. The Government recognises that whilst it is reasonable to reach this conclusion, there is a risk that there could be remaining effects on nationally designated sites. However, there is a need to ensure sufficient sites are available for development to meet the Government's energy policy objectives, as described in Part 2 of this NPS. In view of this and in view of the limited number of potentially suitable sites, the Government does not think the issues in relation to this criterion are sufficient to justify not including the site in this NPS.

C.5.57 The Government has also noted the fact that there will be further detailed assessment of any proposal for the site at project level. The SSA, as a strategic level assessment, has considered impacts on internationally and nationally designated sites of ecological importance, such as SSSIs. Nature and wildlife reserves in local areas may not have statutory status but the Government recognises they can be sites of local importance. The Government considers that impacts upon local sites are more appropriately addressed by the IPC at the development consent stage when Environmental Impact Assessments are undertaken and project level information is available. This site passes this criterion.

Policy notes

C.5.58 See the relevant guidance in EN-1, including that on the Environmental Statement, and biodiversity and geological conservation. See the relevant guidance in Part 3 of this NPS, including that on biodiversity and geological conservation. The IPC should also refer to the Appraisal of Sustainability and Habitats Regulations Assessment for Hinkley Point and consider whether the applicant's proposals have sufficiently taken into account the issues identified, where they are still relevant.

D8: Areas of amenity, cultural heritage and landscape value

Analysis

C.5.59 A number of responses were about the visual impact of transmission infrastructure that may be required by the development. Applications for development consent for nationally significant grid infrastructure will be considered by the IPC within the framework of the Electricity Networks NPS (EN-5).

C.5.60 Some responses were concerned that there could be an adverse impact upon Pixies Mound and the Quantock Hills. The draft Nuclear NPS had set out that the Appraisal of Sustainability identified potential adverse effects on the Wick Barrow Pixies Mound Scheduled Ancient Monument (SAM), which is of national heritage significance. However the Appraisal of Sustainability identifies that there is a likelihood this can be mitigated or impacts can be restricted, although concern is expressed about the setting of the monument. The Appraisal of Sustainability finds that further detailed assessment at project level to consider this and the setting of other above ground cultural assets will be required. Effects arise depending on the distance and sight lines to any new nuclear power station, and any mitigation applied. The Appraisal of Sustainability has identified potential adverse effects on the surrounding elevated local landscape and associated distant views. These include potentially some lasting adverse effects on the setting and views from within the Quantock Area of Outstanding Natural Beauty (AONB) to the west (the AONB is within 5km of the nominated site).

C.5.61 The nominator has set out that the design of a new nuclear power station would seek to avoid, reduce or mitigate any adverse effects on the landscape setting of the AONB, stating that “at a strategic level, new nuclear development within the nominated site is considered unlikely to have a significant impact on the AONB designation owing to their physical separation. A number of measures could be taken to ensure landscape and visual impacts are avoided, reduced or mitigated, including locating the new plant near to the existing stations and implementing an architectural and landscape scheme to help ensure the new plant blends into the landscape as much as possible”[134].

C.5.62 The Appraisal of Sustainability considers that the main form of mitigation potential is the clustering of new and proposed reactor buildings to avoid broadening of the potential visual impact, but even so the Appraisal of Sustainability notes that a new nuclear power station on the nominated site is still likely to lead to perceptible deterioration in some of these views. The Appraisal of Sustainability finds that there appears to be opportunities for

134 See www.energynpsconsultation.decc.gov.uk for the nomination documents for Hinkley Point, and in particular the nomination report for information on landscape and cultural heritage.

mitigating the impacts arising from the new power station on near views given the "potential for strengthening the positive wooded characteristics of the lowland". However, it finds that a new power station would have additional adverse visual impact on views from the Quantock Hills AONB at a sub-regional level, which could not be fully mitigated.

C.5.63 There were concerns that activities such as horse riding, rambling or walking along the coastal path would have to be curtailed. EN-1 sets out that rights of way, National Trails and areas of access to land (e.g. open access land) are important recreational facilities, and sets out that mitigation measures should be considered by the applicant or the IPC as necessary. It also sets out the importance for consideration of coastal recreation and access to the coast. The IPC will consider the implications for development of the creation of a continuous signed and managed route around the coast, as set out in the Marine and Coastal Access Act 2009. Possible mitigation measures might include siting certain elements of a station away from public footpaths and/or the provision of realignments to existing or planned rights of way.

C.5.64 Respondents were concerned about whether the archaeological deposits on the development site would be destroyed at a stage before an application for development consent is submitted to the IPC. Developers may choose to apply for the appropriate permissions to undertake early site works in advance of any application to the IPC. It would be for the relevant authority (for example the local planning authority) to decide whether to grant any such permission, in accordance with the relevant legal framework and taking advice from the relevant statutory bodies, where appropriate. A joint letter from the Department for Communities and Local Government and DECC in July 2009 set out guidance on this issue[135].

Assessment

C.5.65 In assessing this site the Government has considered the purpose of the AONB, which is of conserving and enhancing the natural beauty of the area of outstanding natural beauty. Whilst the Appraisal of Sustainability identifies that some effects on the AONB may remain, this site passes this criterion. This takes into account the fact that the nature, scope, and scale of any effect on the AONB is currently uncertain and is dependent on the exact form of development proposed; that there is scope for a developer and the IPC to explore, in detail, minimisation, avoidance and mitigation of adverse effects; and that there is a need for sites to be available for potential new nuclear power stations as outlined in Part 2 of this NPS, and a limited pool of potentially suitable sites for such developments.

135 See: http://www.decc.gov.uk/assets/decc/What%20we%20do/UK%20energy%20supply/Development%20consents%20and%20planning%20reform/1_20090716112449_e_@@_localauthorityletter.pdf

C.5.66 The potential for remaining effects can only be fully assessed when detailed plans come forward. This is because they depend on a range of factors including the proposals for minimisation and mitigation, the cooling technology proposed and location of transmission infrastructure, and the relevant other development in the area to be factored when considering cumulative effects.

C.5.67 The Government also notes that there may be some visual impacts on the setting of other cultural heritage features in the area. Impact and mitigation measures will need to be considered by the IPC, but at this stage the potential effects are not felt sufficient to outweigh the need for sites as set out in Part 2 of this NPS, particularly given the need for further investigation and the scope for some mitigation that has been identified.

Policy notes

C.5.68 See the relevant guidance in EN-1 and Part 3 of this NPS, including that on landscape and visual impacts.

C.5.69 The IPC should also refer to the Appraisal of Sustainability and the applicant's proposals for Hinkley Point and consider whether the applicant's proposals sufficiently avoid or mitigate potential impacts where they are still relevant.

D9: Size of site to accommodate operation

Analysis

C.5.70 The nominated site is approximately 203 hectares. The Office for Nuclear Regulation has advised that it is reasonable to conclude that there is enough land for the secure operation of at least one new nuclear power station within the nominated area. However, it has advised that there appears to be insufficient land to provide effective defence-in-depth for a nuclear reactor (including its associated turbine hall, spent fuel and intermediate level waste stores) east of longitude grid reference 32128, as the area is of inadequate size. This part of the site could still be used for locating supporting infrastructure that has no potential to directly cause a radiological hazard. Whilst this particular area has insufficient land to provide defence-in-depth, the Office for Nuclear Regulation has confirmed that there is sufficient area within the nominated boundary to house and provide sufficient defence-in-depth for essential infrastructure.

Assessment

C.5.71 Although there is an area which has been identified by the Office for Nuclear Regulation as having insufficient land for the effective defence-in-depth for a nuclear reactor (including its associated turbine hall, spent fuel and intermediate level waste stores), based on the advice of the Office for Nuclear Regulation it is reasonable to conclude that there is enough land

within the boundary nominated to safely and securely operate at least one new nuclear power station, including the safe and secure storage of all the spent fuel and intermediate level waste produced through operation, and from decommissioning, on the site of the station until it can be sent for disposal in a geological disposal facility.

Policy notes

C.5.72 The safety and security of a nuclear power station is considered by the Office for Nuclear Regulation as part of the licensing regime. See Part 3 of this NPS for guidance on the relationship between the regulatory framework and the planning regime.

D10: Access to suitable sources of cooling

Analysis

C.5.73 The advice of the Environment Agency indicates that there appears to be access to potentially suitable sources of cooling at the site. The nominator has proposed a range of potential cooling technologies and stated a preference for direct cooling from the sea[136].

C.5.74 Responses raised concerns about the discharge of heated water, the potential use of biocides, the impact this would have on fish and other organisms in the Bristol Channel and fish entrainment in cooling systems.The Appraisal of Sustainability for Hinkley Point notes that during operation, cooling water abstraction may impact on important fish species (for example, species that are qualifying features of the Severn Estuary SAC). The Appraisal of Sustainability finds it may be possible to mitigate this by including fish deterrent schemes within cooling water intake and adapting system design accordingly, it also finds that, at the project level, further assessment will be required on the biodiversity impacts of abstraction and current methods to mitigate fish entrainment including small fish fry and eggs. A report from the Environment Agency on cooling[137] sets out detailed options for mitigation of this issue. These include location and design of intake structures and screens and the use of fish deterrent and fish recovery return systems. However, further detailed study is required to determine the significance of impacts and mitigation options. The Appraisal of Sustainability also concluded that the discharge of heated water into the Severn Estuary and Bridgwater Bay may affect

136 See footnote 134

137 Environment Agency, *Cooling Water Options for the New Generation of Nuclear Power Stations in the UK,* 2010, http://publications.environment-agency.gov.uk/epages/eapublications.storefront/4d95b71100342058273fc0a802960654/Product/View/SCHO0610BSOT&2DE&2DE

aquatic ecology by raising temperatures and reducing oxygen available to aquatic species.

C.5.75 Any thermal discharge will require consent from the Environment Agency. The Environment Agency has advised that fish populations in the Severn Estuary have been extensively studied. Sea lamprey, river lamprey, twaite and allis shad are designated features of the Severn Estuary SAC. The Atlantic salmon is a designated feature in the Wye and Usk SACs. The Severn Estuary supports the single UK spawning stock of the twaite shad and a substantial part of the total population of salmon in England and Wales. The Estuary acts as a major nursery ground for bass and a range of flatfish species as far upstream as Gloucester.

Assessment

C.5.76 Based on the findings of the Appraisal of Sustainability and the Environment Agency it is reasonable to conclude that there is access to suitable sources of cooling at the site. The site passes this criterion. Detailed modelling as part of the licensing process will give greater clarity about the acceptability of impacts in the light of the cooling technology that is proposed.

Policy notes

C.5.77 See the relevant guidance in EN-1, including Section 5.3 on biodiversity and Section 5.5 on coastal change, given that a new development may require offshore infrastructure for intake and outfall.

C.5.78 See the relevant guidance in Part 3 of this NPS, including that on water quality and resources.

C.5.79 See Part 3 of this NPS for guidance on the relationship between the regulatory framework and the planning regime.

Appraisal of Sustainability and Habitats Regulations Assessment for Hinkley Point

C.5.80 The Planning Act 2008[138] requires an Appraisal of Sustainability to be carried out for all NPSs. The purpose of an Appraisal of Sustainability is to consider the social, economic and environmental impacts of the policy and to suggest possibilities for improving the sustainability of the NPS. The purpose of the Appraisal of Sustainability for Hinkley Point is to examine the potential positive and negative effects of the nominated site, identify the significance of these effects, and suggest any mitigation possibilities. The NPS has also been assessed in accordance with the European Habitats Directive (the Habitats Regulations Assessment). The Habitats Regulations

138 The Planning Act 2008

Assessment tests whether a plan or project could have an adverse effect on the integrity of European Sites of nature conservation importance.

C.5.81 A Habitats Regulations Assessment was carried out on the Hinkley Point site. The key findings of the Hinkley Point Appraisal of Sustainability and Habitats Regulations Assessment highlight areas of significance on, amongst other things:

i) potential negative effects on protected conservation sites and designated species, including the Severn Estuary and the Bridgwater Bay;

ii) potential for adverse effects on water quality caused by the abstraction and release of cooling water;

iii) risk from coastal flooding;

iv) adverse visual impact on views from the Quantock Hills AONB;

v) potential for significant negative cumulative effects if two new nuclear power stations (Hinkley Point and Oldbury) and any potential Severn Tidal power projects are developed[139]; the effects of the latter potential project are likely to be more significant than two new nuclear power stations. These include the potential loss of nationally and internationally important estuarine habitats, where it may not be possible to mitigate fully;

vi) potential for positive cumulative effects associated with long term employment and enhanced prosperity for communities at the sub-regional level if both power stations are built in the Severn Estuary.

C.5.82 Issues i) – iv) are considered in the assessment of the SSA criteria above. Cumulative effects are discussed below.

Cumulative effects

C.5.83 Hinkley Point and Oldbury form a cluster of two nominated sites in the Severn Estuary area. The Appraisal of Sustainability has found that there is the potential for cumulative effects if more than one nuclear power station site were developed in this area. The potential cumulative effects arise as a result of interactions between the sites due to their relative proximity and the way in which effects may act together. Responses were received regarding the potential for cumulative effects with the existing power station

139 The Government has concluded that it does not see a strategic case for public investment in a tidal energy scheme in the Severn estuary at this time, but wishes to keep the option open for future consideration. For further details see http://www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/energy_mix/renewable/severn_tidal_power/severn_tidal_power.aspx

and any new development at Oldbury and any potential Severn Tidal power project. However, the Government has concluded that it does not see a strategic case for public investment in a tidal energy scheme in the Severn estuary at this time[140].

Biodiversity and ecosystems

C.5.84 The site Appraisal of Sustainability report for Hinkley Point identifies that the potential for major adverse effects on sites and species considered of UK-wide and European nature conservation importance means that strategic significant effects on biodiversity cannot be ruled out. The development of nuclear power stations at the other nominated site in the region may increase the significance of the adverse impacts either by adding to the pressures on a particular site of nature conservation importance or by adversely affecting other nearby sites so that the cumulative effects in the region are increased. For Hinkley Point, the European Sites that are at most risk from interactions are the Severn Estuary SAC, SPA and Ramsar sites, the River Wye SAC and the River Usk SAC which have also been identified as potentially being significantly adversely affected by the nominated site at Oldbury. The potential effects on the European Sites from both the Hinkley Point and Oldbury developments are due to adverse effects on water quality and resources, habitat loss and coastal squeeze and disturbance.

Effects on communities: population, employment and viability.

C.5.85 Development at the Hinkley Point site is appraised as having positive effects of regional economic significance on employment and community viability. The Appraisal of Sustainability identified that there are indirect positive health effects associated with enhanced prosperity and long-term employment opportunities although this will only be significant for local communities if employment is secured for local people.

C.5.86 The cumulative positive effects of employment, community viability and health/well-being could be more significant if more than one new nuclear power station is built and the opportunities for upskilling, education, and supporting industries to the nuclear sector are developed at local and regional levels. The site Appraisal of Sustainability report notes that there may be negative effects, during the construction of any new power stations, if the development produces a local shortage of specialist construction labour. This negative effect could be increased if more than one power station is developed in the region. However, these effects may be mitigated if the education and upskilling opportunities noted above are taken and by appropriate phasing of construction.

140 See footnote 139

Water quality and resources

C.5.87 The Appraisal of Sustainability for Hinkley Point identifies potential adverse effects on water including on coastal processes, hydrodynamics and sediment transport. Interactions with development at Hinkley Point could lead to cumulative effects due, for example, to the combined effect of two cooling water discharges. However, the significance of these effects will depend on the type of cooling arrangements adopted and may be modified by interactions with any potential Severn Tidal power project, should it come forward (noting that, as above, the Government has concluded that it does not see a strategic case for public investment in a tidal energy scheme in the Severn estuary at this time). Furthermore, when the remaining operational power stations at Hinkley Point and Oldbury shut down and all the plants are decommissioned, The Appraisal has noted that this will reduce thermal and other water quality impacts in the Severn Estuary. Cumulative effects on water quality may have indirect effects on biodiversity and ecosystems.

Other aspects

C.5.88 The Appraisal of Sustainability finds that there are beneficial cumulative effects on climate change from the NPS and that these are likely to contribute to emission targets at the international and national scales, but are unlikely to be significant at the regional scale.

Conclusion on cumulative effects

C.5.89 Given the uncertainty about the cumulative effects identified by the Appraisal of Sustainability and given the scope for mitigation, the Government does not at this stage, bearing in mind that this is a strategic assessment, think those effects are sufficient in themselves to justify excluding Hinkley Point from this NPS.

C.5.90 Interactions between potential developments can be complex and will depend on what relevant proposals have come forward. This can only be properly assessed at the point at which an application for development consent is made.

C.5.91 Paragraph 4.2.1. of EN-1 sets out that when considering cumulative effects, the Environmental Statement that accompanies an application 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 or granted, as well as those already in existence)[141].

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141 For guidance on the assessment of cumulative effects, see, for example, Circular 02/99, *Environmental impact assessment*; or *Guidelines for the Assessment of Indirect and Cumulative*

C.5.92 If, by the time that any application for development consent for this site is sought, development consent has also been sought or granted for any potential Severn Tidal power project or a new station at Oldbury, the Appraisal of Sustainability indicates that a consideration of cumulative impacts for those sites would be appropriate alongside that of existing nuclear power stations at Hinkley or Oldbury[142]. This should consider the effect on the biodiversity of the region including the River Severn SAC, SPA and Ramsar.

C.5.93 The Appraisal of Sustainability notes that in some cases it is possible to avoid or reduce the potential cumulative adverse effects that are typical of major infrastructure projects (such as nuisance, noise, dust or impacts on local transport networks) through timing and phasing if more than one power station in the region is developed, for example by arranging that peak levels of construction activity do not coincide and that mitigation commitments are implemented through adherence to an agreed Environmental/Sustainability Management Plan.

C.5.94 Applications for development consent for nationally significant grid infrastructure will be considered by the IPC within the framework of the Electricity Networks NPS (EN-5).

Other issues raised during the assessment

C.5.95 This section deals with other common issues at this site that were raised in responses.

Health

C.5.96 The Appraisal of Sustainability for Hinkley Point has considered strategic effects on human health and well being. The Appraisal of Sustainability looks at a range of different factors and should be referred to for a more in depth assessment.

C.5.97 The Appraisal of Sustainability has found that the rigorous system of regulation of routine discharges from any new nuclear power station at Hinkley Point should ensure that there are no unacceptable risks to the health of the local population under normal operating conditions.

C.5.98 The Appraisal of Sustainability also concludes that there is a very small risk of adverse health impacts arising from an accidental release of radiation but the multiple safety features within modern nuclear plants makes such an event exceedingly unlikely. Section 3.13 of this NPS (Human health and wellbeing) sets out that the risk of an accident resulting in exposure to

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Impacts as well as Impact Interactions: http://ec.europa.eu/environment/eia/eia-studies-and-reports/guidel.pdf.

142 See footnote 139

radiation for workers, the public and the environment is very small because of the UK's strict regulatory regime. Section 3.13 should be referred to for further guidance.

C.5.99 It is possible that the presence of a nuclear power station may lead to increased stress levels in certain individuals. Overall, the Appraisal of Sustainability finds that likely enhancement in employment, community wealth, housing stock and other associated neighbourhood infrastructure should improve community well-being and health generally.

C.5.100 Responses to the consultations were particularly concerned about whether there were links between nuclear power stations and cancer. This has been the subject of the work of the Committee on Medical Aspects of Radiation in the Environment (COMARE)[143]. Its view is that there is no evidence for unusual aggregations of childhood cancers in populations living near nuclear power stations in the UK.

C.5.101 COMARE's tenth report considered the incidence of childhood cancer around nuclear installations. These were divided into nuclear power generating stations and other nuclear installations. The results for the power generating stations supported the conclusion that 'there is no evidence from this very large study that living within 25km of a nuclear generating site in Britain is associated with an increased risk of childhood cancer'.

C.5.102 In its eleventh report COMARE examined the general pattern of childhood leukaemia within Great Britain and concluded that 'the search for increased risk levels near to nuclear power generation sites shows no pattern of excess cases of childhood cancer close to the sites of these types of nuclear installations' Among its recommendations, the report said that the incidence of childhood leukaemia and other cancers in the vicinity of Sellafield and Dounreay, which are not power generating stations, was raised and should be kept under surveillance and periodic review.

C.5.103 Responses raised particular concerns about the findings of the KiKK study[144] undertaken in Germany. Following the publication of the KiKK

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143 COMARE is an independent scientific advisory committee providing advice on all aspects of health risk to humans exposed to natural and man-made radiation. It has, for over twenty years, investigated the incidence of childhood cancer and other cancers around nuclear sites. All reports can be found at http://www.comare.org.uk/

144 The results of the *Kinderkrebs in der Umgebung von Kernkraftwerken* (KiKK) study of childhood cancer in the vicinity of German nuclear power plants between 1980 and 2003 was published in 2008 by the German Childhood Cancer Registry (DKKR), based on data from and designed in consultation with the Federal Office for Radiation Protection (BfS). The KiKK study found that there was a correlation between the distance of the home from the nearest nuclear power station at the time of diagnosis and the risk of developing leukaemia before the fifth birthday. However, it also noted that the exposure to ionising radiation in the vicinity of German nuclear power stations was lower by a factor of 1,000 to 100,000 than the exposure to natural

study, COMARE requested that a reanalysis of the UK childhood cancer data used in COMARE's tenth report be carried out using the same methodology as the KiKK study as far as was possible. This reanalysis – the Bithell paper[145] – was published in December 2008. It showed that, for the UK, the conclusions of the COMARE tenth report remained valid when applying methodology closer to that of the KiKK study on the same dataset.The tenth report did however state that for other nuclear sites the situation was more complicated. The study did demonstrate corresponding results to previously published studies that showed excesses of some types of childhood cancer. These results (excess childhood cancers in Seascale near Sellafield; in Thurso near Dounreay and around Aldermaston, Burghfield and Harwell) have been extensively discussed in previous COMARE reports.

C.5.104 In May 2011 COMARE published as its 14th report a further review of the incidence of childhood cancer around nuclear power stations, with particular reference to the KiKK study and COMARE's 10th and 11th reports. In this 14th report, COMARE found no reason to change its previous advice that there is no evidence to support the view that there is an increased risk of childhood leukaemia and other cancers in the vicinity of nuclear power stations due to radiation effects. COMARE also recommends that the Government keep a watching brief in this area.

C.5.105 However, responses made particular reference to childhood leukaemia and cancer clusters in the local populations being elevated. Some cited local studies, such as the Green Audit study which responses commented showed an excess of breast cancer deaths in Burnham on Sea over a four year period and elevated incidences of leukaemia[146]. The Appraisal of Sustainability has noted that local concerns regarding the effects on public health of radioactive discharges into the Severn Estuary from the existing nuclear power stations at Hinkley Point have prompted a number of studies since the 1990s. A study by the South West Cancer Intelligence Service[147] found no evidence of increased risk of cancer linked to radiation exposure in the areas investigated. These findings were later endorsed by COMARE, who concluded there was no evidence of a general excess risk of cancer in the vicinity of Hinkley Point. The analysis in COMARE's tenth report (2005) included Hinkley Point and found that there was no indication of any effect

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background and medical radiation, and that therefore the findings of the study could not be explained in the present state of radiobiologic and epidemiologic knowledge

145 Bithell et al, Radiation Protection Dosimetry 2008 132(2), Childhood leukaemia near British nuclear installations: methodological issues and recent results, pp191-197: http://rpd.oxfordjournals.org/cgi/content/abstract/132/2/191

146 Busby C, *Small Area Cancer Epidemiology for the Citizen,* 2005. http://www.greenaudit.org/citizen_epidemiology.htm

147 South West Cancer Intelligence Service (SWCIS), *Cancer Incidence in Burnham North, Burnham South, Highbridge and Berrow 1990-99*, 2003, http://www.swpho.nhs.uk/resource/

on the incidence of cancer by the nuclear power station within 25km of the site. A later study by Green Audit in 2007[148] referenced an apparent excess in infant mortality in areas downwind of the power station. This report was subsequently reviewed by the South West Public Health Observatory[149], which found no increase in the risk of infant mortality in this area.

C.5.106 There is no clear, widely accepted evidence that local residents have more physical ill health or higher levels of risk to their health from existing doses of radiation arising from radioactive substances released into the environment from the existing power stations, although there remains concern amongst some local groups.

C.5.107 Radioactive monitoring, carried out in 2009, of environmental radioactivity attributable to discharges from Hinkley Point Power Station found low concentrations of artificial radionuclides in water, sediment and beach samples and in meat and seafood samples. However, the presence in the area of other nuclear activities (unconnected with nuclear power stations) make the apportioning of radiological effects in the area difficult. Nevertheless, from this sampling, the estimated total annual dose to the public from all sources within the Hinkley Point area was assessed as being less than 6% of the dose limit for members of the public of 1mSv per year as specified in the Ionising Radiations Regulations 1999[150].

C.5.108 Responses referred to a report produced in January 2011 by environmental group Green Audit raising concerns that that there is evidence of up to 10 tonnes of enriched uranium in the soil at the proposed site. This report was submitted as a consultation response. The Environment Agency produced a report[151] in response and undertook soil sampling. The results of this sampling were published in March 2011[152] and show that there is no enriched uranium in the soil. Uranium is present naturally in small quantities in all rocks and soils. The levels of uranium found in the soil

148 Busby C, de Messieres Mireille, and Morgan S, Infant and Perinatal Mortality and Stillbirths near Hinkley Point Power Station in Somerset 1993-2005.

149 South West Public Health Observatory, *Infant and Perinatal Mortality in Somerset,* http://www.swpho.nhs.uk/resource/browse.aspx?RID=35852

150 Environment Agency (2010). *Radioactivity In Food and the Environment* 2009(RIFE 15) report. This monitoring is conducted annually and can be found at http://www.environment-agency.gov.uk/homeandleisure/110353.aspx

151 EA, *Uranium contamination allegations at Hinkley Point,* 2011, http://www.environment-agency.gov.uk/static/documents/Leisure/Uranium_contamination_allegations_at_Hinkley_Point.pdf

152 EA, *Allegations of contamination by enriched uranium at Hinkley Point,* 2011, http://www.environment-agency.gov.uk/static/documents/Leisure/Uranium_contamination_allegations_at_Hinkley_Point_2.pdf

samples taken both on and off the site are low, and at naturally occurring levels.

Meteorological conditions

C.5.109 A comment was raised about the ability to effect an emergency plan in this area in adverse weather conditions, and how operation of the site would be maintained if nearby roads flooded. As set out in Part 3 of this NPS emergency planning is assessed as part of the site licensing process in conjunction with the advice of the Office for Nuclear Regulation. The Office for Nuclear Regulation has advised that there are acceptable procedures in place at the site for the existing nuclear power station, so it was not foreseen that this would be an issue which would affect the suitability of the site subject to the applicant putting adequate plans in place.

Detailed proposals and local effects

C.5.110 Some responses were concerned about the detailed effects of proposed development on local infrastructure given the rural location of Hinkley Point, and the burden they felt that this may place on local towns. Responses included requests for a Bridgwater and Cannington bypass, concerns about the expansion of Combwich Wharf, accommodation for workers and possible impacts on local services and industry including tourism.

C.5.111 The SSA has not assessed in detail proposals for associated works such as access roads. Such details could change without affecting the overall strategic suitability of the site. The Government believes that this type of proposal is more appropriately considered by the IPC. The IPC will need to consider detailed plans using the guidance provided within EN-1 and EN-6 including consideration of points made in any local authority impact report. Local authorities are a statutory consultee at the project development stage.

C.5.112 Any impact on tourism will be dependent on a number of factors including the nature of the tourism business and the distance of the power station from it, as well as the specifics of the development consent application. The Government notes that there are tourism industries in the surrounding area of some existing nuclear facilities. Section 5.12 of EN-1 sets out that the IPC should consider socio-economic effects including those on tourism.

Conclusion on the site at Hinkley Point

C.5.113 Having reviewed the nominated site against the SSA criteria and considered the evidence from, inter alia, the public, regulators, the Appraisal of Sustainability and Habitats Regulations Assessment site reports, the Government has concluded that the site is potentially suitable. This assessment has outlined that there are a number of areas which will require further consideration by the applicant, the IPC and/or the regulators

should an application for development consent come forward, including amongst other things the potential cumulative impacts of this proposal in combination with other relevant projects in the region, and in particular the effect of this on the biodiversity of the area including the Severn Estuary. However, none of these factors suggest that the site should not be considered as potentially suitable.

C.6 Oldbury

Description of the site

C.6.1 The nominated site is to the north of Oldbury Nuclear Power Station, close to the village of Oldbury-on-Severn in South Gloucestershire, approximately 15 miles to the north east of Bristol. A map is provided later in this Annex. The approximate centre of the site is at Ordnance Survey reference 361300,195300. The south western part of the site comprises silt lagoons 1 and 2 (part of the existing power station site). The remainder is agricultural land which is bounded by Shepperdine Road although there is a small area to the north east of this road. To the west, the site is bounded by the existing flood defences of the Severn Estuary.

C.6.2 The existing Oldbury nuclear power station is a Magnox power station which commenced operation in 1967 and is currently expected to operate until [June 2011].

Deployability by the end of 2025

C.6.3 The Strategic Siting Assessment (SSA) considered whether sites are credible for deployment by the end of 2025[153].

C.6.4 This is because it is important to focus on sites which can come on stream in good time to contribute to the Government's objectives on climate change and energy security. At Oldbury, the Government notes that there are a series of grid agreements in place, the first being to support a connection in 2020 (although this does not mean that the site would be deployed at that date). Horizon Nuclear Power has submitted an Environmental Impact Assessment Scoping Report to the Infrastructure Planning Commission (IPC) and has received a Scoping Opinion from the IPC in return[154]. Horizon Nuclear Power announced in March 2010 that a planning application for a nuclear power station at Oldbury would be submitted once construction is underway at its other nominated site at Wylfa[155].

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153 For the purposes of this NPS, "deployment" means commencing operation of one or more new nuclear power stations on the site.

154 An Environmental Impact Assessment Scoping Report contains, amongst other things, a description of the proposed project, a summary of the key environmental issues and key impacts. The purpose of the Report is to identify the content and extent of the information that will need to be provided by the developer to the competent authority. The IPC's Scoping Opinion sets out what they expect the eventual request for Environmental Impact Assessment consent to cover. See: http://www.horizonnuclearpower.com/oldbury.php; and http://infrastructure.independent.gov.uk/?page_id=202.

155 See the Horizon Nuclear Power Press Release of 30 March 2010 at: http://www.horizonnuclearpower.com/downloads/Horizon_Nuclear_Power_announces_development_programme.pdf

C.6.5 The Government is satisfied from the information provided by nominators and an independent assessment that, at the point of publication, Oldbury is credible for deployment by the end of 2025 regardless of whether it is deployed by that date.

Assessment of suitability against SSA criteria

C1: Demographics

Analysis

C.6.6 The Office for Nuclear Regulation has advised that the site does not exceed the semi-urban criterion. Responses questioned the suitability of the nominated site given its proximity to a range of settlements from the nearby town of Thornbury (approximately 5km), the city of Bristol (approximately 21km) and settlements on the opposite side of the Severn such as Chepstow and Lydney. Some responses highlighted that populations in these settlements had increased since the original Oldbury power station was developed.

Assessment

C.6.7 In analysing this criterion the Office for Nuclear Regulation's generic demographic analysis[156] was carried out to a radius of 30km from the nominated site and takes into account population centres out to that distance.

C.6.8 The Office for Nuclear Regulation's assessment is based on data from the National Population Database 2, updated in 2008, and therefore takes into account changes in populations since development of the existing power station.

C.6.9 This site passes the demographics criterion.

Policy notes

C.6.10 See Section 3.6 of this NPS on flags for local consideration[157].

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156 This was undertaken using the approach outlined here http://www.hse.gov.uk/landuseplanning/land-use-planning.pdf

157 Flags for Local Consideration are siting criteria that were identified through the SSA consultation in 2008, but which (usually due to the need for detailed site-specific investigations and data) would be more appropriately assessed at the project level.

C2 and D5: Proximity to military activities

Analysis

C.6.11 The Ministry of Defence has advised that the site identified does not occupy any Ministry of Defence statutory safeguarding zones protecting aerodromes, explosive storage sites, technical sites or ranges. The Ministry of Defence has advised that it is reasonable to conclude, at a strategic level, that any likely power station development within the site boundary can be protected against the risk of external hazards created by neighbouring military activities throughout its lifetime[158]. The Office for Nuclear Regulation has agreed with this advice.

C.6.12 The Ministry of Defence has advised that no military firing activity occurs in the marine or landward areas adjoining the site. There are no military or explosive nuclear facilities within 1000 metres of the site. Given the proximity to military activities the Ministry of Defence has also advised that it is reasonable to conclude, at a strategic level, that any likely power station development within the nominated site boundary will not adversely affect the capabilities of the armed forces to carry out essential training and operations throughout its lifetime.

Assessment

C.6.13 Based on the advice of the Office for Nuclear Regulation and the Ministry of Defence it is reasonable to conclude that:

- the site does not occupy any Ministry of Defence areas which would give rise to the site being excluded from assessment;
- the site is not in proximity to any Ministry of Defence assets or activities that would suggest that it should be ruled out;
- any likely power station development within the site boundary can be protected against the risk of external hazards created by neighbouring military activities throughout its lifetime; and
- the development of a new nuclear power station at the site would not affect the capabilities of the armed forces to carry out essential training and operations throughout its lifetime.

C.6.14 This site therefore passes these criteria.

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158 See entry D2 in the table “The SSA criteria and how the sites were assessed” at the end of this Annex for details on the potential lifetime of the site and the period this assessment covers.

Policy notes

C.6.15 See Section 5.4 of EN-1 on Civil and Military Aviation and Defence Interests.

D1: Flooding, storm surge and tsunami

Analysis

Flood Zones

C.6.16 The nominated site is in Flood Zone 3, high probability. This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year[159].

C.6.17 Some responses felt that as the site was within Flood Zone 3, it must be unsuitable for development. The Government believes that the fact that a site is in Flood Zone 3 should not prevent a site from being considered potentially suitable for the deployment of a nuclear power station by 2025 if the independent regulator has advised that the site can potentially be protected. At Oldbury the Environment Agency and the Office for Nuclear Regulation has advised that the site can potentially be protected from flood risk, including the effects of climate change, throughout its lifetime (see below).

C.6.18 In addition to considering the availability of other sites in lower flood zones, the Government has taken a sequential approach which involves giving priority to areas at lower risk of flooding[160].

In addition to submitting a flood risk assessment in accordance with Section 5.7 of EN-1, this NPS also sets out that the IPC will still need to be satisfied that a sequential approach has been applied at the site level to ensure that, where possible, critical infrastructure is located in the lowest flood risk areas within the site.

Flooding impacts elsewhere

The Appraisal of Sustainability has found that the rigorous system of regulation of routine discharges from any new nuclear power station at Wylfa should ensure that there are no unacceptable risks to the health of the local population under normal operating conditions. The Environment Agency has also advised that possible measures to mitigate the flood risk

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159 See PPS25 for a full definition of the Flood Zones and what they cover: *Planning Policy Statement 25: Development and Flood Risk*, December 2006, Annex D pp.22-25:http://www.communities.gov.uk/documents/planningandbuilding/pdf/planningpolicystatement25.pdf

160 See Section 3.7 of this NPS for more detail

to the site could have an adverse impact on the flood risk to the surrounding area by reducing the capability of the area to absorb and disperse flood water. This would also be true in relation to the nominator's suggestion that the development site be raised[161] if land were removed from an area of the existing flood plain. Responses were also received regarding flood risk to local streams from flood mitigation measures. The Environment Agency has advised that a suitable approach could be developed at Oldbury which would improve the protection of the surrounding area. Further modelling and surveying should be conducted as part of the detailed appraisal of possible mitigation measures. This appraisal would include consideration of local features such as streams and rivers.

Extreme flooding events, sea level rise and the effects of climate change

C.6.19 Responses were received regarding the flooding events of 1607 experienced in the River Severn and Bristol Channel, which is sometimes described as a tsunami. The 2005 DEFRA report entitled "The threat posed by tsunami to the UK" examined this event and found that "in this case, the combination of a high tide and a storm surge at the time provides a likely explanation for the flooding" [162]. The report suggests that, for most credible scenarios, wave heights produced at the coast by tsunami-type events are unlikely to exceed those anticipated for major storm surges. All major centres of development on coasts and estuaries have defences that are designed to withstand such surge waves. The 1607 flooding is part of the historical record and information from scenarios such as this can help to decide levels of flood protection needed. It is worth noting that the regulatory requirement is for sites to be safe against what is likely to be a more severe event, a 1 in 10,000 year flooding event.

C.6.20 In applying for development consent for a nuclear power generating station, the applicant will need to satisfy the IPC that it has identified the effects of the credible maximum scenario in the most recent projections of marine and coastal flooding. The applicant must be able to demonstrate that future measures for adaptation and flood management at the site can be achieved. Before a site licence is granted, the regulators will need to be satisfied that for the lifetime of the site the power station can be defended against external hazards including flooding. This includes the time that spent fuel may be stored on site.

C.6.21 The Appraisal of Sustainability identified potential adverse effects relating to flood risk arising from predicted rising sea levels caused by climate

161 For nomination documents for Oldbury see www.energynpsconsultation.decc.gov.uk

162 See: http://www.defra.gov.uk/environment/flooding/documents/risk/tsunami05.pdf

change, especially during the later stages of operation and decommissioning of any new nuclear power station[163].

C.6.22 Waste will be stored in safe and secure interim storage facilities until a geological disposal facility becomes available. It is currently anticipated that disposal of new build wastes would begin once disposal of legacy wastes is completed. Geological disposal of higher activity waste from new nuclear power stations is currently expected to be available for new build waste from around 2130[164].The Government has been advised by the Environment Agency and the Office for Nuclear Regulation on this criterion. This advice was based on a consideration of the capacity of nominated sites to withstand flood risk and coastal erosion including the potential effects of climate change using modelling data that looks ahead to 2100. Predictions of potential climate change effects become increasingly less certain the further into the future that they extend. However, climate change projections will continue to be refined and, as time passes, will project further into the future. As such, should greater future impact be predicted, this should be identified well in advance, giving time for appropriate actions to be taken to address those impacts.

C.6.23 The regulators have also examined the adaptability of the sites to potential changes in flood hazard and are satisfied that additional safeguards are in place to ensure that only suitable sites achieve development and ongoing operational consent. This will also be reviewed in more detail as part of the planning and licensing stage and as part of the Flood Risk Assessment that applicants must undertake in conjunction with their applications to the IPC.

C.6.24 Should sites achieve development consent, their capacity to withstand potential climate change will remain under consideration throughout the life of the nuclear power station. Once licensed, as part of the site licensing conditions, the licensee must review their safety case at regular intervals (typically on a ten yearly basis). This review will take the most recent climate change projections into account and allow the necessary

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163 *Appraisal of Sustainability site report for Oldbury*, October 2010, www.energynpsconsultation.decc.gov.uk

164 On the assumption that spent fuel will be stored on-site until it can be disposed of, the key factors in determining the duration of on-site storage are the availability of a geological disposal facility (GDF) and the time required for the spent fuel to cool sufficiently for disposal in a GDF. The Nuclear Decommissioning Authority (NDA's) current indicative timetable anticipates a GDF being available to take spent fuel from new nuclear power stations from around 2130, although the future optimisation of plans for the implementation of geological disposal and the expected inventory for disposal indications may provide potential to bring forward this date. Optimisation work will also explore options for reducing the cooling time required for spent fuel prior to disposal. The Government will expect operators to ensure their waste is disposable when a GDF is anticipated to be available to take the waste. See Section B.4 of this NPS for more detail. An indicative timeline for Geological Disposal can be found at http://www.decc.gov.uk/assets/decc/What%20we%20do/UK%20energy%20supply/Energy%20mix/Nuclear/geological-disposal-board/982-geological-disposal-timeline.pdf

modifications to flood defences and/or operating arrangements to be undertaken. The objective of the review is to compare the safety case of the site against modern standards to see if there are reasonably practicable improvements that could be made, to ensure that the plant is safe to continue to operate, including spent fuel and radioactive waste storage for the next defined period.

Other points

C.6.25 The Environment Agency has also noted that current access to the site is via minor roads which cross extensive flood risk areas and that any access will need to be assessed for suitability, and possibly protected against flooding.

C.6.26 The Appraisal of Sustainability has also identified possible impacts on coastal processes, hydrodynamics and sediment transport from any necessary new or upgraded coastal defences and the Environment Agency has noted for all nominated sites that protecting the site from flood risk now and in the future prevents the coastline and estuary from changing and adapting naturally. Whilst the Appraisal of Sustainability has found that mitigation may be possible through appropriate design and construction of defences, it is recommended that hydrodynamic and sediment transport surveying and modelling should be conducted as part of the detailed appraisal to determine baseline conditions. This data can then be used to determine an appropriate management strategy for combating the long term effects of climate change on the coastline.

Assessment

C.6.27 This site passes this criterion.

C.6.28 This takes into account in particular the advice of the Environment Agency that any new nuclear power station on the site could potentially be protected against flood risk throughout its lifetime, including the potential effects of climate change, storm surge and tsunami. The advice of the Appraisal of Sustainability and the Environment Agency is that countermeasures would be possible, but would have to be carefully designed to avoid adverse impacts.

Policy notes

C.6.29 See Section 5.7 of EN-1 and Section 3.7 of this NPS on flood risk.

D2: Coastal processes

Analysis

C.6.30 The Environment Agency has advised that development at the site could potentially avoid or mitigate the effects of coastal erosion or other

landscape change scenarios throughout its lifetime, including the potential effects of climate change.

C.6.31 Based on the current understanding of coastal erosion in this area the Environment Agency has advised that there is no technical reason that would prevent the site being protected or mitigated from the effects of coastal erosion. Responses suggested that the current site at Oldbury has already altered the shoreline on the opposite (i.e. Forest of Dean) side of the river, with Plusterwyne farm losing land through erosion. Whilst the Environment Agency is aware of erosion and accretion on the shoreline it is not aware of any studies of effects at Plusterwyne caused by the existing Oldbury nuclear power station.

C.6.32 Responses stated that the NPS, and therefore the IPC, should 'have regard' to the Shoreline Management Plan (SMP2) published by the Environment Agency. SMP2s are a 'route map' for local authorities and other decision makers to move from the present situation towards meeting future needs of the coastline. SMP2s identify the most sustainable approaches to managing the risks to the coast in the short term (0-20 years), medium term (20-50 years) and long term (50-100 years). Within these timeframes, SMP2s will also include an action plan that prioritises what work is needed to manage coastal processes into the future, and where it will happen.

C.6.33 As referenced in EN-1, should an application for development consent come forward, the applicant will need to demonstrate that they have assessed the implications of the proposed project on strategies for managing the coast set out in the latest Shoreline Management Plan.

Assessment

C.6.34 The site passes this criterion.

C.6.35 Based on the evidence presented and the advice received, it is reasonable to conclude that a nuclear power station at the site could be protected against coastal erosion, including the effects of climate change, for the lifetime of the site.

C.6.36 Mitigation of the effects of coastal erosion may be possible through appropriate design and construction of defences.

Policy notes

C.6.37 See Section 5.5 of EN-1 and Section 3.9 of this NPS on coastal change.

D3: Proximity to hazardous industrial facilities and operations

Analysis

C.6.38 Based on Health and Safety Executive records the nominated site is not in the vicinity of any COMAH establishments[165].

C.6.39 The Health Office for Nuclear Regulation has advised that as with all sites during licensing the applicant to the Office for Nuclear Regulation will also need to take account of the need for countermeasures to protect nuclear operations from any hazards and risks from any nearby notified major hazard pipelines, based on information from the relevant pipeline operators about their routes and the fluids being conveyed.

Assessment

C.6.40 The site passes this criterion.

C.6.41 Given that the site is not in proximity to hazardous facilities, it is reasonable to conclude, at a strategic level, that any likely power station development within the nominated site boundary can be protected against risk arising from proximity to hazardous facilities throughout its lifetime, taking into account possible countermeasures. As part of their assessment of a proposed power station regulators consider the developer's estimation of the threats posed to the site by nearby hazardous facilities and any proposed mitigating action.

Policy notes

C.6.42 See Section 4.12 of EN-1.

C.6.43 The applicant should demonstrate that it has consulted the Local Planning Authority where appropriate.

D4: Proximity to civil aircraft movements

Analysis

C.6.44 The Civil Aviation Authority has advised that it is potentially reasonable to conclude that any likely power station development within the nominated site boundary can be protected against risks from civil aircraft movement. The Office for Nuclear Regulation has agreed with this advice.

C.6.45 Nuclear power stations in the UK receive some protection from aviation activity through the creation of a "Restricted Area" at each individual station

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165 Under the Planning (Control of Major Accident Hazards) Regulations 1999. See http://www.hse.gov.uk/comah/background/comah99.htm# for more information.

(such Restricted Areas are established by legislation[166]). Typically such Restricted Areas have a radius of two nautical miles and extend vertically to 2000 feet above the surface. Any aviation activity within a Restricted Area is limited to that specifically permitted by legislation. The existing Oldbury nuclear power station has an associated Restricted Area.

C.6.46 The Civil Aviation Authority has advised that a Restricted Area around the nominated site (or an amendment to the existing Restricted Area) could provide a similar level of protection from civil aircraft movements. The Civil Aviation Authority has also advised that it is potentially reasonable to conclude that neighbouring aerodromes and air traffic control areas can mitigate any effects arising from the Restricted Area around the nominated nuclear power site.

C.6.47 The current establishment of the existing Oldbury Restricted Area and that related to the nearby Berkeley Power Station is such that the impact of a new Restricted Area (as described above) upon aircraft in transit through local airspace is likely to be negligible. Responses were received regarding the proximity of Bristol Filton Aerodrome. It is not anticipated that any new Restricted Area established in association with the proposed nuclear installation would impact upon local aerodrome operations. A new Restricted Area is expected to provide a similar level of protection from civil aircraft movements as that at the existing station.

C.6.48 There are no other known (i.e. marked on Civil Aviation Authority approved charts or promulgated in the UK Aeronautical Information Publication) landing sites in such proximity to the proposed nuclear installation that a new or amended Restricted Area would have a material impact on associated operations.

C.6.49 There were also concerns about the impact of aircraft including from terrorism. The Office for Nuclear Regulation and the Environment Agency are currently undertaking a process of Generic Design Assessment (GDA) of new nuclear reactor designs. GDA allows the generic safety, security and environmental implications of new nuclear reactor designs to be assessed up front. The GDA process takes into account all reasonably foreseeable external threats. This includes meteorological phenomena, the effects of climate and landscape change, geological disturbance, seismic activity, flooding and aircraft impact.

Assessment

C.6.50 This site meets this criterion.

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166 See the Air Navigation (Restriction of Flying) (Nuclear Installations) Regulations 2007 (SI 1929/2007).

C.6.51 Given the advice above it is reasonable to conclude that any likely power station development within the nominated site boundary can be protected against risks from civil aircraft movement, and that the effects on air traffic and aerodromes can potentially be mitigated.

Notes on policy

C.6.52 See Section 3.14 of this NPS on proximity to civil aircraft movements.

C.6.53 See Section 5.4 of EN-1 on civil and military aviation and defence interests.

For D5 see C2

D6: Internationally designated sites of ecological importance[167]

Analysis

C.6.54 The Appraisal of Sustainability[168] identified that the potential for adverse effects on sites and species of European nature conservation importance which means that significant strategic effects on biodiversity cannot be ruled out at this stage of the appraisal.

C.6.55 The Appraisal of Sustainability notes that some of these designations fall immediately adjacent to the nominated site and development activities may encroach into these designated areas. For example the potential for a marine landing facility and upgraded flood protection measures could all have adverse impacts. The Appraisal of Sustainability also highlights the potential for cumulative effects with any potential new nuclear power station at Hinkley Point These are discussed further under "cumulative effects", below.

C.6.56 The findings of the Appraisal of Sustainability are drawn from the Habitats Regulations Assessment for Oldbury[169]. The conclusions of the Habitats Regulations Assessment are limited by the strategic nature of the assessment process and the information available, which does not generally allow for a definitive prediction of effects on the European Sites considered. It notes that a precautionary approach suggests that the assessment at this strategic level cannot rule out the potential for adverse effects on site integrity at five European Sites – the Severn Estuary SAC, SPA and Ramsar site, the River Usk SAC and the River Wye SAC – through impacts on water resources and quality, habitat and species loss

167 These are occasionally referred to as "European Sites", "European designated sites", or "sites of European importance". See entry D6 in the table "The SSA criteria and how the sites were assessed" at the end of this annex for details of these designations and what they cover.

168 See footnote 163

169 DECC, *Habitats Regulations Assessment: site report for Oldbury*, October 2010, www.energynpsconsultation.decc.gov.uk

and fragmentation/coastal squeeze and disturbance (noise/vibration, light and visual). The Habitats Regulations Assessment has proposed a suite of avoidance and mitigation measures to be considered as part of any project level Habitats Regulations Assessment.

C.6.57 At this stage, it finds that the effective implementation of these mitigation measures may help to address adverse effects on European Site integrity, but that more detailed project level Habitats Regulations Assessment is required in order to draw conclusions on their effectiveness.

C.6.58 Responses focused on the potential impacts on the Severn Estuary which is a designated SAC/SPA/Ramsar site. There were suggestions that the construction of temporary wharf facilities may affect the Severn Estuary SAC, SPA and the Ramsar site (in particular local bird species such as Bewick's swans and white fronted geese) during both the construction and operational period as they may be disturbed by noise, the presence of cooling towers and potential associated plumes from the cooling towers. There were concerns that plumes would lead to microclimate change in what responses felt was already a vulnerable wetland habitat.

C.6.59 The Environment Agency has advised that there might be some micro-climate effects local to the cooling towers. It is not possible to say at this strategic stage whether these effects would be significant to local wetland habitats and whether or not the effects would be adverse or beneficial. However, the discussion under D8 makes clear that natural draught cooling towers at this site are now unlikely. Hybrid cooling towers are shorter. Section 5.9 of EN-1 sets out that modern hybrid cooling systems, e.g. mechanical draught, do not generally exhibit visible steam plumes except in exceptional adverse weather conditions and that the IPC should expect the applicant to justify use of a cooling system that involves visible steam plumes or has a high visible structure, such as a very large natural draught cooling tower. It should be satisfied that the application of modern hybrid cooling technology or other technologies are not reasonably practicable before giving consent to a development with natural draught cooling towers. Cooling towers are discussed further under criterion D8. If there were likely to be further impacts these would need to be considered under the Environmental Impact Assessment when the precise nature and location of the cooling towers is known.

C.6.60 The Habitats Regulations Assessment report identified that disturbance from noise during construction and operation could have impacts on bird species in the SPA (Bewick's swans, white fronted goose, gadwall, dunlin, shelduck, redshank, curlew, pintail, ringed plover) and in the Ramsar (waterfowl species). Disturbance could come from construction activity, movement of materials, intermittent sounds from machinery, vehicles and plant (such as sirens) or movement of the workforce. The Habitats Regulations Assessment site report has suggested avoidance and mitigation measures for the IPC to consider, for example, phasing of

development works to take account of breeding or feeding cycles and habitats, and flight lines and migration routes of sensitive species.

Concern was expressed about the effects of removing existing silt lagoons which respondents said currently provide a high tide roost for waders feeding in the upper reaches of the Severn Estuary, with populations of Ringed Plover, Dunlin and Curlew. Respondents noted these species as qualifying features of the Severn Estuary SPA. The effects of any such proposal would need to be assessed further should a development proposal come forward as effects would depend on detailed plans including whether the silt lagoons were removed or not. The Habitats Regulations Assessment report for Oldbury identified that habitat loss as a result of construction of the power station and associated infrastructure (such as a marine offloading facility) could result in potential adverse effects on the Severn Estuary SAC, SPA and Ramsar site. The Habitats Regulations Assessment site report has set out a number of suggested avoidance and mitigation measures for the IPC to consider such as requiring site layout to avoid areas of known importance or sensitivity.

Assessment

C.6.61 The Government notes the scope for avoidance and mitigation identified in the Habitats Regulations Assessment, and the need for more detailed studies should an application for development consent come forward. Given that the Habitats Regulations Assessment has not been able to rule out adverse impacts on sites of European nature conservation importance, the Government has carefully considered whether it is appropriate to include this site in this NPS. Annex A of this NPS sets out that the Government has concluded that there is an Imperative Reason of Overriding Public Interest that favours the inclusion of this site in the Nuclear NPS despite the inability to rule out adverse effects on European Sites at this stage. This takes into account the need for sites to be available for potential deployment by the end of 2025, the lack of alternatives, and the consideration given to compensatory measures. This site therefore passes this criterion.

C.6.62 The potential impacts of development on the SAC, SPA and the Ramsar site will be taken into account in the project level assessments (including a further project level Habitats Regulations Assessment) and considered by the IPC as part of the application for development consent.

Policy notes

C.6.63 See Section 4.2 of EN-1 on the Environmental Statement and Section 4.3 on Habitats Regulations Assessment and Section 5.3 on biodiversity and geological conservation. See the relevant sections of this NPS including Section 3.10 on biodiversity and geological conservation.

C.6.64 The IPC should also consider the Appraisal of Sustainability and Habitats Regulations Assessment for Oldbury and consider whether the applicant's proposals have sufficiently taken into account the issues identified, where they are still relevant.

D7: Nationally designated sites of ecological importance

Analysis

C.6.65 The Appraisal of Sustainability has identified that the potential for adverse effects on sites and species considered to be of national nature conservation importance means that significant strategic effects on biodiversity cannot be ruled out at this stage of the appraisal. The Appraisal of Sustainability has identified the following Sites of Special Scientific Interest (SSSIs) within 5km of the nominated site where it finds that significant effects may occur: Severn Estuary SSSI; Upper Severn Estuary SSSI; and River Wye (Lower Wye) SSSI.

C.6.66 The Appraisal of Sustainability notes that some of the designations (the River Severn) lie immediately adjacent to the nominated site and development activities may encroach into these designated areas. For example the potential for a marine landing facility, cooling water infrastructure, the tidal lagoon and upgraded flood protection measures could all have adverse impacts. The Appraisal of Sustainability site report has identified that there is the potential for the mitigation of biodiversity effects on sites of national conservation importance including the creation of replacement habitat.

C.6.67 Concerns have also been raised about the Slimbridge Wildfowl and Wetlands Trust's Slimbridge Reserve and the impact that a development may have on it in relation to the feeding grounds for the birds, for instance through the construction being disruptive to the bird populations and the potential vapour plumes from the cooling towers. The SSA considered impacts on internationally and nationally designated sites of ecological importance, such as SSSIs. Nature and wildlife reserves in local areas may not have statutory status but the Government recognises they can be sites of local importance. The Government considers that impacts upon local sites are more appropriately addressed by the IPC at the development consent stage when Environmental Impact Assessments are undertaken and project level information is available. In relation to the impacts upon nationally designated sites of ecological importance, the Appraisal of Sustainability concluded that there could be potential adverse effects on bird populations arising from noise, visual impact and light disturbance. Vapour plumes are discussed in criterion D6.

Assessment

C.6.68 The Government notes that the Appraisal of Sustainability has identified potential impacts on nationally designated sites of ecological importance

which it considered of strategic significance. Given the scope for mitigation of biodiversity effects identified in the Appraisal of Sustainability for sites of national importance it is reasonable to conclude that it may be possible to avoid or mitigate impacts. The Government recognises that whilst it is reasonable to reach this conclusion, there is a risk that there could be remaining effects on nationally designated sites. However, there is a need to ensure sufficient sites are available for development to meet the Government's energy policy objectives, as described in Part 2 of this NPS. In view of this and in view of the limited number of potentially suitable sites, the Government does not think the issues in relation to this criterion are sufficient to justify not including the site in this NPS. The Government has also noted the fact that there will be further detailed assessment of any proposal for the site at project level. This site passes this criterion.

Policy Notes

C.6.69 See the relevant guidance in EN-1, including that on the Environmental Statement and biodiversity and geological conservation, and Section 5.9 on landscape and visual impacts for policy on cooling towers.

C.6.70 See the relevant guidance in Part 3 of this NPS, including that on biodiversity and geological conservation.

C.6.71 The IPC should also refer to the Appraisal of Sustainability for Oldbury and consider whether the applicant's proposals have sufficiently taken into account the issues identified, where they are still relevant.

D8: Areas of amenity, cultural heritage and landscape value

Analysis

C.6.72 The nomination for Oldbury stated that development of a new nuclear power station on the nominated site would utilise cooling towers. At that point, in the absence of a final choice of technology, the nominator[170] stated that the cooling towers would be between 70 metres and 200 metres in height, with forced draught towers at the lower end of this range and natural draught towers at the upper end[171]. Whilst the nominator identified some mitigating actions, such as the alignment of the towers within the site and the relationship with the existing power station, the colour of the materials from which key buildings and structures are constructed, and the type of lighting used around the site and at a more local level, earth shaping and the planting of new copses, hedgerows and tree belts, it

170 At the time of nomination, the nominator was E.ON. This site is now taken forward by Horizon Nuclear Power.

171 Horizon environmental scoping report for Oldbury: http://www.horizonnuclearpower.com/downloads/horizon-env-ecoping-report.pdf

recognised that methods of mitigation are limited, and not all effects will be mitigated fully[172].

C.6.73 This was recognised by the draft Appraisal of Sustainability which identified potential adverse effects on the local landscape and indirect effects on the wider landscape. These include lasting adverse indirect landscape and visual impacts from the proposed development on parts of the Wye Valley Area of Outstanding Natural Beauty (AONB) and the Cotswolds AONB which are 7km to the north west and 13km to the east of the nominated site respectively. The Appraisal of Sustainability finds that further development is still likely to lead to a perceptible deterioration in some views, which would not be able to be fully mitigated given the scale of the possible new buildings, and that cooling towers could increase these effects.

C.6.74 A large number of responses commented on the visual impact of the proposals, particularly focussing on the visual impacts of natural draught cooling towers of 200 metres in height. Responses stated that the impacts of natural draught towers could not be mitigated to an acceptable level, particularly in regard to visual impact on the surrounding AONBs and other protected areas and buildings, specifically mentioning Thornbury and Berkeley Castles, St Mary's Church Thornbury and Acton Court, St Mary's Church in Shepperdine, and the Chapel House in Shepperdine. Responses were also concerned about the effect that natural draught cooling towers would have on the rural character of the general area. Concerns were also raised that the potential plumes from the cooling towers would cause further visual impacts.

C.6.75 In September 2010 Horizon Nuclear Power announced that, based on current information, a 'hybrid' cooling tower design was its preferred option for the proposed new nuclear power station at Oldbury on Severn[173]. Modern hybrid cooling systems (e.g. mechanical or forced draft) have a lesser visual impact than natural draught cooling systems because the cooling towers are shorter. Furthermore, they do not generally exhibit visible steam plumes, except in exceptional adverse weather conditions. There is an efficiency penalty, however for using mechanical towers, as they require electricity to run.

C.6.76 The Appraisal of Sustainability identified potential adverse effects on Scheduled Ancient Monuments (SAM), conservation areas, a registered park and garden and listed buildings, which may be of regional or national heritage significance, as well as on medieval agricultural earthworks and buried archaeology of potentially high importance. The Appendices of the Appraisal of Sustainability[174] detail the cultural heritage assets in the area

172 See footnote 161

173 http://www.horizonnuclearpower.com/oldbury.php

174 See the Appendices to Appraisal of Sustainability: site report for Oldbury, October 2010,

including the Thornbury Conservation Area and Registered Park and Garden of Thornbury Castle lying c.4.2km to the south-east, and 228 Grade II listed buildings within c.5km (although there are no listed buildings within or adjacent to the existing nuclear power stations)[175].

C.6.77 Further concerns were raised about the extent to which any new transmission lines would have visual impacts and the potential for undergrounding.

C.6.78 The Appraisal of Sustainability finds that in combination effects (potentially) could also arise from new offsite grid connectivity. Whilst the impact of transmission was considered at a strategic level by the Appraisal of Sustainability, it is not an SSA criterion. The Appraisal of Sustainability notes that overall the new power station would be seen in the context of existing power station facilities, prior to any decommissioning.

Assessment

C.6.79 In assessing this site the Government has considered the purpose of the AONBs, which is of conserving and enhancing the natural beauty of the area of outstanding natural beauty. The Government notes the Appraisal of Sustainability's conclusion that further development at Oldbury is highly likely to lead to a perceptible deterioration in some views, (including from within AONBs), which would not be able to be mitigated given the scale of possible new buildings.

C.6.80 At Oldbury, the visual impact of 200m high natural draught cooling towers would increase effects over a wide area due to both the height of the towers and the topography of the Severn Valley. However, the Government notes the preference expressed by Horizon for hybrid towers. Whilst it is not possible to completely eliminate the visual impacts associated with a generating station, developments with hybrid towers would be likely to be of a height that is more in keeping with the existing power station (any new station would be seen in the context of the existing station as they will be situated next to one another). This would reduce visual impact to the surrounding areas. Furthermore, hybrid towers do not generally exhibit visible steam plumes, except in exceptional adverse weather conditions. These systems are normally considered as the "Best Available Techniques" (BAT).

C.6.81 In addition, Section 5.9 of EN-1 sets out that, when considering visual impacts, the IPC should presume that the adverse impacts would be less if a hybrid or direct cooling system is used and that developers will use BAT.

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175 Grade I buildings are of exceptional interest, sometimes considered to be internationally important. Grade II* buildings are particularly important buildings of more than special interest. Grade II buildings are nationally important and of special interest. See www.english-heritage.org.uk.

The IPC should therefore expect the applicant to justify BAT for the use of a cooling system that involves visible steam plumes or has a high visible structure, such as a natural draught cooling tower. It should be satisfied that the application of modern hybrid cooling technology or other technologies is not reasonably practicable before giving consent to a development with natural draught cooling towers[176].This would apply to any application for development consent containing natural draught towers at Oldbury.

C.6.82 EN-1 recognises that the historic environment includes all aspects of the environment resulting from the interaction between people and places through time. Whilst some of the buildings of concern are not listed and not recognised as “heritage assets”, the Government acknowledges that they can be of local importance. EN-1 states that advice and information about the significance of known, but non-designated heritage assets with archaeological interest may be obtained from County Archaeologists in England and, where appropriate, the developer should seek to do this.

C.6.83 Notwithstanding the potential for adverse effects on the AONBs and the uncertainty about whether full mitigation and avoidance of all of these effects is possible, after careful consideration the Government believes that in relation to this criterion, the site is potentially suitable.

C.6.84 Following on from the announcement of Horizon’s preference for hybrid towers, and in combination with the policy that before giving consent to any development proposing natural draught towers the IPC should be satisfied that the application of modern hybrid cooling technology is not reasonably practicable, the likelihood of natural draught towers at this site is reduced. At this site, the Environment Agency has advised that the strategic level assessment suggests that hybrid towers would appear to be practicable at the site.

C.6.85 Some responses said that the site was the only site which required cooling towers, and as such it should not be on the list. The Government has not stipulated that natural cooling towers are unacceptable in principle at this stage, because if modern hybrid cooling towers prove to be impracticable for any type of power station, the Government believes that developers should be allowed to present other options and the IPC should be able to consider them. There are a limited number of sites that have been found to be potentially suitable for new nuclear power stations, and for those developers are not precluded from bringing forward proposals for cooling towers.

C.6.86 The nature, scope, and scale of any effect is currently uncertain and is dependent on the exact form of development proposed and even hybrid

176 Paragraph 5.9.4, EN-1

towers will bring impacts. Nonetheless there is scope for a developer and the IPC to explore in detail minimisation, avoidance and mitigation of adverse effects; and there is a need for sites to be available for potential new nuclear power stations as outlined in Part 2 of this NPS.

Policy notes

C.6.87 See the relevant guidance in EN-1 and Part 3 of this NPS, including that on landscape and visual impacts.

C.6.88 The IPC should also refer to the Appraisal of Sustainability and the applicant's proposals for Oldbury and consider whether the applicant's proposals sufficiently avoid or mitigate potential impacts where they are still relevant.

C.6.89 Regarding other landscape and cultural effects, the IPC should refer to the Appraisal of Sustainability and the applicant's proposals for Oldbury and consider whether the applicant's proposals sufficiently avoid or mitigate these potential effects.

D9: Size of site to accommodate operation

Analysis

C.6.90 The site is approximately 150 hectares. The site has a public road, track and footpaths bisecting it. It is a security requirement that the licencee has exclusive rights of access to, and control of, a civil licensed nuclear site and that it is not therefore bisected by any public rights of way. The Office for Nuclear Regulation has advised that this is of sufficient size and shape for the safe and secure operation of a new nuclear power station.

Assessment

C.6.91 Based on the advice of the Office for Nuclear Regulation it is reasonable to conclude that there is enough land within the boundary nominated to safely and securely operate at least one new nuclear power station, including the safe and secure storage of all the spent fuel and intermediate level waste produced through operation, and from decommissioning, on the site of the station until it can be sent for disposal in a geological disposal facility.

C.6.92 An applicant would need to consider mitigating actions such as siting elements of a station away from public footpaths, or realignments, to meet the requirements of a nuclear site licence. Given the size of the site it is reasonable to conclude that there is the potential to mitigate these concerns.

Policy notes

C.6.93 The safety and security of a nuclear power station is considered by the Office for Nuclear Regulation as part of the licensing regime. See Part 3 of

this NPS for guidance on the relationship between the regulatory framework and the planning regime.

C.6.94 Section 5.10 of EN-1 (Land Use including open space, green infrastructure and green belt) sets out that rights of way, National Trails and areas of access to land (e.g. open access land) are important recreational facilities and that mitigation measures should be considered by the applicant or the IPC as necessary. It also sets out the importance for consideration of coastal recreation and access to the coast. The IPC will consider the implications for development of the creation of a continuous signed and managed route around the coast, as set out in the Marine and Coastal Access Act 2009, using the guidance in EN-1. Possible mitigation measures might include siting certain elements of a station away from public footpaths and/or the provision of realignments to existing or planned rights of way.

D10: Access to suitable sources of cooling

Analysis

C.6.95 The nomination proposed the potential use of cooling towers at this site. The SSA considers whether a site is potentially suitable regardless of more detailed plans which could arguably change. The assessment has therefore also considered the impacts of direct cooling.

C.6.96 Although there are existing discharges from the current Oldbury power station, the Appraisal of Sustainability has found that for a new direct cooled power station the return of cooling water to the Severn Estuary at elevated temperatures may cause failures to existing water quality standards and could also impact on coastal processes, including sediment transport. Any future thermal discharge would require an Environmental Permit from the Environment Agency and would require the discharge to meet existing water quality standards[177]. The Appraisal of Sustainability has noted that water abstraction could potentially cause an adverse effect on a major fish migration route, as well as mortality from fish entrapment in the cooling water intake. This could, to a certain extent, be mitigated by the installation of fish protection measures in cooling water intake/outfall systems.

C.6.97 The Appraisal of Sustainability assessed that the thermal plume discharged through direct cooling could be expected to give rise to unacceptable environmental impacts (because of its size). The nomination concurred. It detailed a range of potential cooling technologies but noted that “direct cooling for the proposed station is not felt to be appropriate at this site as

177 The Environmental Permitting (England and Wales) Regulations 2010 came into force on 6 April 2010 and cover all water discharge activities. Water discharge consents will become Environmental Permits, and applications for new discharges will fall under the new regulations.

the required water amounts would be considerably larger than those required for the existing Magnox power station and would be expected to give rise to unacceptable environmental impacts by virtue of the size of thermal plume discharged in the Severn Estuary"[178]. The adoption of an indirect cooling arrangement of some sort was therefore considered the most likely solution and the Environment Agency agreed with this assessment and has advised that it is potentially reasonable to conclude that there is access to suitable sources of cooling at this site. As discussed under criterion D8, the Government notes Horizon Nuclear Power announced in September 2010 that, based on current information, a 'hybrid' cooling tower design was its preferred option for the proposed new nuclear power station at Oldbury on Severn[179].

C.6.98 Responses expressed concern that, even with the use of cooling towers, heat discharge from the power station into the Severn Estuary may be unacceptable. Cooling towers transfer waste heat to the atmosphere by evaporating water. It was claimed that some water from the Severn Estuary would be used in the cooling tower and would contain salt.

C.6.99 The Appraisal of Sustainability notes that a reduction in the need to abstract cooling water from the existing tidal reservoir on the River Severn, such as that which would be achieved through the use of cooling towers, would reduce impact on the fish populations in the Severn Estuary. The Environment Agency has advised that sea lamprey, river lamprey, twaite and allis shad are designated features of the Severn Estuary SAC. The Atlantic salmon is a designated feature in the Wye and Usk SACs.

C.6.100 Whilst there is a reduction in the need for water when using cooling towers, in addition to make up water to replace that which is evaporated, there would be a requirement for purging of the water in the system back to the Severn Estuary to avoid the build up of salt. The Environment Agency advise that it was aware of this when it gave its original advice that it "agrees with the nominator's assessment of the cooling technologies that are feasible for a new nuclear power station within the nominated site." While detailed proposals have not been made the Environment Agency would not expect (or permit) proposals that had an unacceptable impact on the Severn Estuary.

C.6.101 The Appraisal of Sustainability notes that a reduction in the need to abstract cooling water from the existing tidal reservoir on the River Severn, such as that which would be achieved through the use of cooling towers, would also reduce impact on the fish populations in the Severn Estuary. The Environment Agency has advised that sea lamprey, river lamprey,

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178 See footnote 161, in particular Supplementary Information – D10 – Further Information on Access to Suitable Sources of Cooling.

179 See http://www.horizonnuclearpower.com/oldbury.php

twaite and allis shad are designated features of the Severn Estuary SAC. The Atlantic salmon is a designated feature in the Wye and Usk SACs.

C.6.102 The Severn Estuary supports the single UK spawning stock of the twaite shad and a substantial part of the total population of salmon in England and Wales. The Severn Estuary acts as a major nursery ground for bass and a range of flatfish species as far upstream as Gloucester. Responses were concerned that active liquid discharges would be made from the site and would have a much greater effect at Oldbury where lower dilutions would be achieved.

C.6.103 The Environment Agency has considered the impact of discharges from the existing station. Their authorisations require the operator to use the best practicable means to minimise the impact of radioactive discharges, and the Environment Agency expect the operator's procedures to define conditions for discharges such as the state of the tide. This would also need to be addressed in any application to the Environment Agency regarding a new site.

C.6.104 Concerns were expressed about insufficient cooling water. These were often linked to the visual impact of cooling towers located at the site – whilst cooling towers would minimise impacts on marine ecology and biodiversity in the Severn Estuary, at the upper end of the height range suggested by the nominator (200m), they would have had visual impacts which are discussed in relation to Criterion D8.

C.6.105 In relation to these concerns, it was suggested that smaller reactors should be developed at the site to negate the need for cooling towers. The SSA is focused upon sites which can be deployed by 2025 and the GDA process is currently assessing reactors which might be used by new nuclear power stations deployed by 2025. Designs must be approved by the Generic Design Assessment before they can be deployed. Currently industry has submitted two designs to be assessed – the 1650MW capacity EPR and the 1100MW capacity AP1000. Because these reactors have a significantly greater output than the existing station at Oldbury, they have a need for greater cooling capacity. No smaller reactors have been submitted for assessment in GDA. Based on the findings of the Appraisal of Sustainability and the Environment Agency it is reasonable to conclude that there is access to suitable sources of cooling at the site.

C.6.106 Responses were also concerned about potential noise impacts from the proposed cooling towers and the impacts that the noise may have on local residents. Noise impacts will depend on the ultimate technology choice, and mitigations that may be applied including the use of landscaping, bunds or noise barriers to reduce noise to outlying areas. EN-1 contains guidance on noise impacts. Amongst other things, it specifically states that the IPC should expect a noise assessment to have been undertaken by the developer, where appropriate, which considers noise impacts during the

construction and operational phases of the development, as well as from any associated transportation infrastructure.

C.6.107 There were also concerns about whether plumes from cooling towers would contribute to microclimate change in a vulnerable wetland habitat. The effects of plumes are discussed under criterion D6 - it is noted that hybrid towers do not generally exhibit visible plumes except in exceptional adverse weather conditions.

Assessment

C.6.108 The site passes this criterion. Detailed modelling as part of the licensing process will give greater clarity about the acceptability of impacts in the light of the cooling technology that is proposed. Any proposals for cooling towers may have less impact on designated habitats in the River Severn but will have to be carefully considered in the light of visual impacts on the surrounding area.

C.6.109 The IPC will not grant development consent unless it is satisfied that all reasonable steps have been taken, and will be taken, to minimise noise impacts.

Policy Notes

C.6.110 See the relevant guidance in EN-1, including Part 3 on landscape and visual impact, section 5.3 on biodiversity and Section 5.5 on coastal change, given that it is possible that a new development may require offshore infrastructure for intake and outfall.

C.6.111 See the relevant guidance in Part 3 of this NPS, including that on water quality and resources (Section 3.8).

C.6.112 See Part 3 of this NPS for guidance on the relationship between the regulatory framework and the planning regime.

Appraisal of Sustainability and Habitats Regulations Assessment for Oldbury

C.6.113 The Planning Act 2008[180] requires an Appraisal of Sustainability to be carried out for all NPSs.

C.6.114 The purpose of an Appraisal of Sustainability is to consider the social, economic and environmental impacts of the policy and to suggest possibilities for improving the sustainability of the NPS.

C.6.115 The purpose of the Appraisal of Sustainability for Oldbury is to examine the potential positive and negative effects of the nominated site, identify the

180 The Planning Act 2008

significance of these effects, and suggest any mitigation possibilities. The NPS has also been assessed in accordance with the European Habitats Directive. That assessment (the "Habitats Regulations Assessment") tests whether a plan or project could have an adverse effect on the integrity of European Sites of nature conservation importance. A Habitats Regulations Assessment was carried out on the Oldbury site. The key findings of the Oldbury Appraisal of Sustainability and Habitats Regulations Assessment highlight areas of significance on, amongst other things —

i) potential negative effects on nationally and internationally protected conservation sites, namely the Severn Estuary SAC, SPA, Ramsar and SSSI sites, the Upper Severn Estuary SSSI, River Wye (Lower Wye) SSSI, the River Wye SAC and the River Usk SAC;

ii) potential flood risk; potential impact of natural draught cooling towers[181] including on two AONBs;

iii) potential for very significant negative cumulative effects if two new nuclear power stations (Hinkley Point and Oldbury) and any potential Severn tidal power project are developed [182];

iv) and potential for positive cumulative effects associated with long term employment and enhanced prosperity for communities at the sub-regional level if both power stations are built in the Severn Estuary.

C.6.116 The outputs of the Appraisal of Sustainability and Habitats Regulations Assessment on key findings i) and ii) are taken into account in the summaries against the SSA criteria above. Cumulative effects are discussed below.

Cumulative effects

C.6.117 Hinkley Point and Oldbury form a cluster of two nominated sites in the Severn Estuary area. The Appraisal of Sustainability has found that there is the potential for cumulative effects if more than one nuclear power station site were developed in this area. The potential cumulative effects arise as a result of interactions between the sites due to their relative proximity and the way in which effects may act together. Responses were received regarding the potential for cumulative effects with the existing power station, any new development at Hinkley Point and developments elsewhere at Avonmouth and any potential Severn Tidal power project

181 To note discussion under criterion D8, which significantly limits the likelihood of such towers.

182 The Government has concluded that it does not see a strategic case for public investment in a tidal energy scheme in the Severn estuary at this time, but wishes to keep the option open for future consideration. For further details see http://www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/energy_mix/renewable/severn_tidal_power/severn_tidal_power.aspx

should it come forward (however, the Government has concluded that it does not see a strategic case for public investment in a tidal energy scheme in the Severn Estuary at this time- see footnote 216). . The cumulative effects which are assessed as being of strategic significance are discussed below.

Biodiversity and ecosystems

C.6.118 Responses were also received regarding the potential for cumulative effects including ecological impacts on species such as shad and lamprey, as well as salmon and non-migratory species such as otter.

C.6.119 The site Appraisal of Sustainability report for Oldbury identifies that the potential for major adverse effects on sites and species considered of UK-wide and European nature conservation importance means that strategic significant effects on biodiversity cannot be ruled out. The development of nuclear power stations at the other nominated site in the region may increase the significance of the adverse impacts either by adding to the pressures on a particular site of nature conservation importance or by adversely affecting other nearby sites so that the cumulative effects in the region are increased. For Oldbury, the European Sites that are at most risk from interactions are the Severn Estuary SAC, SPA and Ramsar sites, the River Wye SAC and the River Usk SAC which have also been identified as potentially being significantly adversely affected by the nominated site at Hinkley Point. The potential effects on the European Sites from both the Oldbury and Hinkley Point developments are due to adverse effects on water quality and resources, habitat loss and coastal squeeze and disturbance.

Effects on communities: population, employment and viability.

C.6.120 Development at the Oldbury site is appraised as having positive effects of regional economic significance on employment and community viability. The Appraisal of Sustainability identified that there are indirect positive health effects associated with enhanced prosperity and long-term employment opportunities although this will only be significant for local communities if employment is secured for local people.

C.6.121 The cumulative positive effects of employment, community viability and health/well-being could be more significant if more than one new nuclear power station is built and the opportunities for upskilling, education, and supporting industries to the nuclear sector are developed at local and regional levels. The site Appraisal of Sustainability report notes that there may be negative effects, during the construction of any new power stations, if the development produces a local shortage of specialist construction labour. This negative effect could be increased if more than one power station is developed in the region. However, these effects may be mitigated if the education and upskilling opportunities noted above are taken and by appropriate phasing of construction.

C.6.122 The cumulative effects associated with these impacts if a number of large developments went ahead concurrently in the area were a concern to a few responses. The number of workers moving to the area was expressed as a particular concern, with references to the numbers of workers required for the construction of a potential Oldbury power station in conjunction with other projects in the area. Guidance on considering socio-economic effects including cumulative effects is in Section 5.12 of EN-1 (see also the section below on socio-economic impacts).

C.6.123 A number of responses commented on the potential cumulative visual impacts to the area if the Oldbury nuclear power station was developed, along with the existing industrial infrastructure buildings at Avonmouth. The visual impact of cooling towers is discussed under criterion D8.

Water quality and resources

C.6.124 The Appraisal of Sustainability for Oldbury identifies potential adverse effects on water including on coastal processes, hydrodynamics and sediment transport. Interactions with development at Oldbury could lead to cumulative effects due, for example, to the combined effect of two cooling water discharges (although the Government notes the proposals for cooling towers at this site). However, the significance of these effects will depend on the type of cooling arrangements adopted. Furthermore, when the remaining operational power stations at Oldbury and Hinkley shut down and all the plants are decommissioned, this will reduce thermal and other water quality impacts in the Severn Estuary. Cumulative effects on water quality may have indirect effects on biodiversity and ecosystems.

Other aspects

C.6.125 The Appraisal of Sustainability finds that there are beneficial cumulative effects on climate change from the NPS and that these are likely to contribute to emission targets at the international and national scales, but are unlikely to be significant at the regional scale.

Conclusion on cumulative effects

C.6.126 Given the uncertainty about the cumulative effects identified by the Appraisal of Sustainability and given the scope for mitigation, the Government does not at this stage, bearing in mind that this is a strategic assessment, think those effects are sufficient in themselves to justify excluding Oldbury from this NPS.

C.6.127 Interactions between potential developments can be complex and will depend on what relevant proposals have come forward. This can only be properly assessed at the point at which an application for development consent is made.

C.6.128 Paragraph 4.2.1. of EN-1 sets out that when considering cumulative effects, the Environmental Statement that accompanies an application 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 or granted, as well as those already in existence) [183].

C.6.129 If, by the time that any application for development consent for this site is sought, development consent has also been sought or granted a new station at Hinkley Point or any other major project, the Appraisal of Sustainability indicates that a consideration of cumulative impacts for those sites would be appropriate alongside that of existing nuclear power stations at Hinkley or Oldbury. This should consider the effect on the biodiversity of the region including the River Severn SAC, SPA and RAMSAR.

C.6.130 The Appraisal of Sustainability notes that in some cases it is possible to avoid or reduce the potential cumulative adverse effects that are typical of major infrastructure projects (such as nuisance, noise, dust, or impacts on local transport networks) through timing and phasing if more than one power station in the region is developed, for example by arranging that peak levels of construction activity do not coincide and that mitigation commitments are implemented through adherence to an agreed Environmental/Sustainability Management Plan.

C.6.131 Applications for development consent for nationally significant grid infrastructure will be considered by the IPC within the framework of the Electricity Networks NPS (EN-5). Applicants are required to consult local communities about their plans before submitting them to the IPC.

Other issues raised during the assessment

C.6.132 This section deals with other common issues at this site that were raised in responses

Health

C.6.133 The Appraisal of Sustainability for Oldbury has considered strategic effects on human health and well being. The Appraisal of Sustainability looks at a range of different factors and should be referred to for a more in depth assessment.

C.6.134 The Appraisal of Sustainability has found that the rigorous system of regulation of routine discharges from any new nuclear power station at

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183 For guidance on the assessment of cumulative effects, see, for example, Circular 02/99, *Environmental impact assessment*, or *Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions* (http://ec.europa.eu/environment/eia/eia-studies-and-reports/guidel.pdf).

Oldbury should ensure that there are no unacceptable risks to the health of the local population under normal operating conditions.

C.6.135 The Appraisal of Sustainability also concludes that there is a very small risk of adverse health impacts arising from an accidental release of radiation but the multiple safety features within modern nuclear plants makes such an event exceedingly unlikely. Section 3.13 of this NPS (Human health and wellbeing) sets out that the risk of an accident resulting in exposure to radiation for workers, the public and the environment is very small because of the UK's strict regulatory regime. Section 3.13 should be referred to for further guidance.

C.6.136 It is possible that the presence of a nuclear power station may lead to increased stress levels in certain individuals. Overall, the Appraisal of Sustainability finds that likely enhancement in employment, community wealth, housing stock and other associated neighbourhood infrastructure should improve community well-being and health generally.

C.6.137 Responses were particularly concerned about whether there were links between nuclear power stations and cancer. This has been the subject of the work of the Committee on Medical Aspects of Radiation in the Environment (COMARE)[184]. Its view is that there is no evidence for unusual aggregations of childhood cancers in populations living near nuclear power stations in the UK.

C.6.138 COMARE's tenth report considered the incidence of childhood cancer around nuclear installations. These were divided into nuclear power generating stations and other nuclear installations. The results for the power generating stations supported the conclusion that 'there is no evidence from this very large study that living within 25km of a nuclear generating site in Britain is associated with an increased risk of childhood cancer'.

C.6.139 In its eleventh report COMARE examined the general pattern of childhood leukaemia within Great Britain and concluded that 'the search for increased risk levels near to nuclear power generation sites shows no pattern of excess cases of childhood cancer close to the sites of these types of nuclear installations' Among its recommendations, the report said that the incidence of childhood leukaemia and other cancers in the vicinity of Sellafield and Dounreay, which are not power generating stations, was raised and should be kept under surveillance and periodic review.

184 COMARE is an independent scientific advisory committee providing advice on all aspects of health risk to humans exposed to natural and man-made radiation. It has, for over twenty years, investigated the incidence of childhood cancer and other cancers around nuclear sites. All reports can be found at http://www.comare.org.uk/

C.6.140 Responses raised particular concerns about the findings of the KiKK study[185] undertaken in Germany. Following the publication of the KiKK study, COMARE requested that a reanalysis of the UK childhood cancer data used in COMARE's tenth report be carried out using the same methodology as the KiKK study as far as was possible. This reanalysis – the Bithell paper[186] – was published in December 2008. It showed that, for the UK, the conclusions of the COMARE tenth report remained valid when applying methodology closer to that of the KiKK study on the same dataset.The tenth report did however state that for other nuclear sites the situation was more complicated. The study did demonstrate corresponding results to previously published studies that showed excesses of some types of childhood cancer. These results (excess childhood cancers in Seascale near Sellafield; in Thurso near Dounreay and around Aldermaston, Burghfield and Harwell) have been extensively discussed in previous COMARE reports.

C.6.141 In May 2011 COMARE published as its 14th report a further review of the incidence of childhood cancer around nuclear power stations, with particular reference to the KiKK study and COMARE's 10th and 11th reports. In this 14th report, COMARE found no reason to change its previous advice that there is no evidence to support the view that there is an increased risk of childhood leukaemia and other cancers in the vicinity of nuclear power stations due to radiation effects. COMARE also recommends that the Government keep a watching brief in this area.

C.6.142 Responses made particular reference to leukaemia and cancer clusters in the local populations being elevated. Some responses referred to local studies undertaken around the current Oldbury Power Station which looked at incidences of cancer. COMARE has advised that following the report by Dr. Chris Busby on an excess of myeloid leukaemia in 0-4 year olds in Chepstow[187], the COMARE 10th report considered the incidence of myeloid leukaemia at ages 0-4 within 25km of nuclear power plants. The

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185 The results of the *Kinderkrebs in der Umgebung von Kernkraftwerken* (KiKK) study of childhood cancer in the vicinity of German nuclear power plants between 1980 and 2003 was published in 2008 by the German Childhood Cancer Registry (DKKR), based on data from and designed in consultation with the Federal Office for Radiation Protection (BfS). The KiKK study found that there was a correlation between the distance of the home from the nearest nuclear power station at the time of diagnosis and the risk of developing leukaemia before the fifth birthday. However, it also noted that the exposure to ionising radiation in the vicinity of German nuclear power stations was lower by a factor of 1,000 to 100,000 than the exposure to natural background and medical radiation, and that therefore the findings of the study could not be explained in the present state of radiobiologic and epidemiologic knowledge.

186 Bithell et al, Radiation Protection Dosimetry 2008 132(2), Childhood leukaemia near British nuclear installations: methodological issues and recent results, pp191-197: http://rpd.oxfordjournals.org/cgi/content/abstract/132/2/191

187 C. Busby, *Childhood leukaemia and cancer in Chepstow, opposite Oldbury nuclear power station*, 2001, http://www.llrc.org/health/subtopic/chepstow.htm

report concluded that the result for Oldbury is found not to be significant and the analysis included 14 cases in the 25-year period 1969–1993 as compared with the 3 found by Dr. Busby in the 17-year period 1974–1990. The COMARE 10th report concluded there was no evidence of a statistically significant increase of childhood leukaemia in the vicinity of Oldbury, consistent with all nuclear power plants in the UK. COMARE has also investigated reports of cancer clusters in adults around Oldbury and these reports were not substantiated[188].

Radioactive monitoring, carried out in 2009, of environmental radioactivity attributable to discharges from Oldbury Power Station found low concentrations of artificial radionuclides in water, sediment and beach samples and in meat and seafood samples. However, the presence in the area of other nuclear activities (unconnected with nuclear power stations) make the apportioning of radiological effects in the area difficult. Nevertheless, from this sampling, the estimated total annual dose to the public from all sources within the Oldbury area was assessed as being less than 6% of the dose limit for members of the public of 1mSv per year as specified in the Ionising Radiations Regulations 1999[189].

C.6.143 Some responses said that tritium discharges from power stations are unmonitored and may be harmful to the health of the community. It was asked whether the SSA should have assessed this. Tritium occurs naturally in the environment and is also created in nuclear power stations when they generate electricity. Some of the tritium created in the power stations is discharged into the atmosphere and into the sea via the cooling water outfall. In both cases it will be dispersed into the environment.

C.6.144 Tritium has a low radiotoxicity compared with many other radionucleotides, and as such has a small potential dose impact. At power stations the Environment Agency applies annual limits on the tritium activity that can be discharged and requires that operators use the best available techniques to minimise discharges. Limits on discharge are strictly enforced and monitored by the Environment Agency and are limited to less than one third of the annual dose limit per site.

Comments on the geological stability of the site

C.6.145 Some responses said that ground conditions at the Oldbury nominated site is not suitable for a large development, such as a nuclear power station, resulting in issues with subsistence at the existing power station. It was mentioned that the site is on Mercia Mudstone. Geological and

188 Further details of COMARE statements and reports can be found at http://www.comare.org.uk.

189 Environment Agency. *Radioactivity In Food and the Environment* 2009 (RIFE 15) report, 2010. This monitoring is conducted annually and can be found at http://www.environment-agency.gov.uk/homeandleisure/110353.aspx

geotechnical conditions in the UK are generally benign when compared with some other parts of the world. The UK does not have deep tropically weathered soils, permanently frozen ground, volcanoes or high mountains, for example. However the UK has a very varied geology and earth-surface processes that create some particular (non seismic) hazards that need to be considered in assessing the relative merits of nuclear power station sites, such as river or coastal alluvium or cavernous bedrock.

C.6.146 Although the list of geological and geotechnical hazards relevant to nuclear power stations is long, these are common considerations in the siting of a wide range of structures in the UK, and are generally amenable to resolution by appropriate design and construction works, with some sites costing more to develop than others. Indeed, some of the UK's existing nuclear power stations are on sites where it was necessary to engineer solutions to mitigate certain geological and geotechnical hazards. Section 3.6. of this NPS sets out that non-seismic ground conditions will be considered by the Office for Nuclear Regulation during licensing.

Comments on socio-economic effects

C.6.147 A number of responses expressed concern on the effects of the construction and operation of the proposed power station in relation to the local community. Concerns included the effect on house prices in the area (which was often linked to concern regarding the visual impact of cooling towers), employment availability to local people, the security that may be required if there were protests and increased levels of crime and the strain put on the local councils and health authorities as a result of increases in local populations.

C.6.148 The potential for impact on population dynamics is noted in Section 5.12 of EN-1. The NPS directs the IPC to consider potential socio-economic effects of development when assessing development consent applications and they will be able to do this at a point when it is clearer how many workers would be required for a development, at what point, or what proportion of these would have to come from outside the local area. Local authorities are a statutory consultee at the project development stage and may submit an impact report to the IPC.

Comments on transport

C.6.149 A number of responses commented on the effects a power station development may have on the local road infrastructure. Amongst a range of roads and junctions that were mentioned, in particular Junction 14 on the M5 and the A38 were of concern, as well as roads in the areas of Falfield, Rockhampton, Hill, Whitfield and Grovesend. There was also concern about how the project could interact with predicted traffic levels in the area and very specific local circumstances such as daily stoppages on the B4061 when cattle are moved.

C.6.150 Detailed assessments of transport impacts were not made as part of the SSA. The developer would also be expected to come forward with detailed plans that would clarify the main access route for the potential power station and the likely level of usage. The Appraisal of Sustainability finds that it is possible that effective transport plans could help to mitigate the effects of increased levels of traffic.

Conclusion on the nominated site at Oldbury

C.6.151 Given that the site meets the SSA criteria, and having considered the evidence from, inter alia, the public, regulators, the Appraisal of Sustainability and Habitats Regulations Assessment site reports, the Government has concluded that the site is potentially suitable. This assessment has outlined that there are a number of areas which will require further consideration by the applicant, the IPC and/or the regulators should an application for development consent come forward, including amongst other things the mitigation of flood risk, the visual impact of any new cooling towers, the impact of this proposal in combination with any other relevant nuclear power stations in the region, and in particular the effect of this on the biodiversity of the Severn Estuary). However, the Government has concluded that none of these factors is sufficient to prevent the site from being considered as potentially suitable.

C.7 Sellafield

Description of the site

C.7.1 The nominated site is located on the West Cumbria coast in the Borough of Copeland, approximately 15km south of Whitehaven and 45km north of Barrow in Furness, centred on grid reference 302007, 504271. The site is located to the north, west and north west of the existing Sellafield Nuclear Licensed Site, and comprises approximately 250 hectares of farm land.

Deployability by the end of 2025

C.7.2 The Strategic Siting Assessment (SSA) considered whether sites are credible for deployment by the end of 2025[190]. This is because it is important to focus on sites which can come on stream in good time to contribute to the Government's objectives on climate change and energy security. The Government has given careful consideration to the deployability of this site given that, whilst adjacent to the nuclear facility at Sellafield, this is a site which has not hosted a nuclear power station before (although it is very close to the site of Calder Hall nuclear power station, which ceased operating in 2003, and is adjacent to the extensive existing nuclear facilities at Sellafield).

C.7.3 Some responses felt there was progress towards deployability by 2025 including the purchase in October 2009 of land for deployment by Iberdrola, GDF Suez and Scottish and Southern Energy, and discussions with local stakeholders on access to the National Grid and options for routing. The consultation on the draft NPS also demonstrated County Council support for the nomination at Sellafield.

C.7.4 There are general complicating factors when developing at locations which have not hosted nuclear facilities before including lack of pre-existing infrastructure; no history of operation at the site and consequently much less qualified information about site characteristics in relation to nuclear; and a potential lack of qualified workforce. Whilst these factors are not SSA criteria, they may have a bearing on whether a site can be deployed by the end of 2025.

C.7.5 The proximity to the existing Sellafield nuclear facility gives some synergies at a strategic level when examining the potential of the site to host a nuclear facility. In addition, the nominator of the site has undertaken a series of studies to further characterise the site. It has also undertaken extensive engagement with relevant parties including the local authority.

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190 For the purposes of this NPS, "deployment of new nuclear power stations" means commencing operation of one or more new nuclear power stations on the site.

C.7.6 The most significant necessary new infrastructure for this site is grid infrastructure. A connection offer has been made to the nominator by National Grid. The offer is for 1600MW from 31 October 2023 and a further 1600MW by 31 October 2025, enabling transmission of 3200MW by October 2025 (this does not mean a station will be deployed by that date). At this site a grid connection agreement remains in place and responses demonstrate that work is continuing on routing options. National Grid have also advised that work is progressing to connect 3.2GW of additional generation in Cumbria via a new 400kv double circuit overhead line. This would in theory accommodate two reactors at Sellafield. National Grid has noted that the project to connect Sellafield is complex taking into account the location and surrounding area.

C.7.7 The Government is mindful that the last operating nuclear power station in the area (at Calder Hall) ceased operating in 2003. Nonetheless, West Cumbria is host to the largest concentration of nuclear facilities in the UK, representing some 60% of the total industry, with a continuing focus on developing skills and education. It is therefore likely that the fact that this site is adjacent to the existing Sellafield facilities and its location in West Cumbria will give it access to a qualified workforce and associated technical support. There is also strategic support for energy infrastructure in the region. The sub-regional regeneration plan supports new nuclear generation[191] in West Cumbria as well as the building of a low-carbon economy in areas such as renewable energy, although it is noted that this report pre-dates the SSA and the nomination of Sellafield.

C.7.8 From the information provided by nominators and an independent assessment there are, on balance, reasonable grounds to conclude that the Sellafield site is credible for deployment by the end of 2025 at the point of publication of this NPS. This takes into account the existing bank of knowledge about the site, that there is a level of strategic support for development in the region, the interest of potential developers and the grid connection agreement in place and is regardless of whether the site is deployed by that date.

Assessment of suitability against SSA criteria

C1: Demographics

Analysis

C.7.9 The Office for Nuclear Regulation has advised that the site does not exceed the semi-urban criterion.

191 The West Cumbria regeneration plan Britain's Energy Coast: http://www.britainsenergycoast.com/nuclearnewbuild/page1.php

Assessment

C.7.10 This site passes the demographics criterion.

Policy notes

C.7.11 See Section 3.6 of this NPS on flags for local consideration[192].

C2 and D5: Proximity to military activities

Analysis

C.7.12 The Ministry of Defence has advised that the site identified does not occupy any Ministry of Defence statutory safeguarding zones protecting aerodromes, explosive storage sites, technical sites or ranges and it is not within 1000 metres of any Ministry of Defence Danger Areas.

C.7.13 No military firing activity occurs in the marine or landward areas adjoining the site. There are no military or explosive nuclear facilities within 1000 metres of the site. An offshore Danger Area (D406) containing Eskmeals Firing Range is located approximately 3500 metres west of the site. The offshore area in which firing is contained is remote from the shore and as such there is no direct hazard from this military activity.

C.7.14 The Ministry of Defence has advised that it is reasonable to conclude, at a strategic level, that any likely power station development within the site boundary can be protected against the risk of external hazards created by neighbouring military activities throughout its lifetime[193]. The Office for Nuclear Regulation has agreed with this advice.

C.7.15 The Ministry of Defence has also advised that given the proximity to military activities it is potentially reasonable to conclude, at a strategic level, that any likely power station development within the nominated site boundary will not adversely affect the capabilities of the armed forces to carry out essential training and operations throughout its lifetime. However, the Restricted Area that encompasses the existing Sellafield nuclear facility (EG R413) overlaps with the Danger Area that contains the Eskmeals Firing Range (EG D406). The site identified for a new nuclear power station is northwest of the existing facility and as such a new Restricted Area (or

192 Flags for Local Consideration are siting criteria that were identified through the SSA consultation in 2008, but which (usually due to the need for detailed site-specific investigations and data) would be more appropriately assessed at the project level.

193 See entry D2 in the table “The SSA criteria and how the sites were assessed” at the end of this Annex for details on the potential lifetime of the site and the period this assessment covers.

expansion of EG R413) may extend across Ministry of Defence Danger Area EG D406 or otherwise inhibit access to the Danger Area by aircraft.

C.7.16 The Ministry of Defence has noted that the application of an exception to any new or revised Restricted Area established permitting aircraft using the Danger Area to fly through it should adequately address this concern. The Ministry of Defence would wish to be consulted further on any such arrangements should development of this site proceed. The Ministry of Defence has also noted that military low flying training is conducted throughout the UK. It is anticipated that any new Restricted Area established to protect this facility would afford sufficient separation of such aircraft movements from any tall structures that may be built at the site. Consultation with the Ministry of Defence would also therefore cover whether air navigation warning lights are considered necessary.

C.7.17 Responses were received for Kirksanton about the possibility of munitions left over from military training (possibly at Silecroft Range) posing a risk to any nuclear power station at Kirksanton and the assessment has considered whether there is any relevance to Sellafield. The Ministry of Defence has confirmed that the nominated site is not in proximity to any historic munitions disposal site or Danger Area. The Ministry of Defence has noted that the Sellafield site is approximately 20km from the northern boundary of what was the Silecroft range. Whilst the Ministry of Defence were not able to confirm the type of firing activities conducted at Silecroft Range from historical records, it has advised that extensive weapon testing took place along the coast adjacent to Sellafield. It has advised that if any munitions washed up on the coast they would be made safe and removed by the Ministry of Defence.

Assessment

C.7.18 Based on the advice of the Office for Nuclear Regulation and the Ministry of Defence it is reasonable to conclude that:

- the site does not occupy any Ministry of Defence areas which would give rise to the site being excluded from assessment;
- the site is not in proximity to any Ministry of Defence assets or activities that would suggest that it should be ruled out; and
- any likely power station development within the site boundary can be protected against the risk of external hazards created by neighbouring military activities throughout its lifetime.

C.7.19 Regarding the previous use of Silecroft Range, an applicant for a nuclear site licence will be required to satisfy the Office for Nuclear Regulation that an on and off site survey of potential hazards has been undertaken and that the risk to the site of any identified hazards has been adequately assessed.

C.7.20 Based on the advice of the Ministry of Defence, it is potentially reasonable to conclude that the development of a new nuclear power station at the site would not affect the capabilities of the armed forces to carry out essential training and operations throughout its lifetime. Potential mitigating actions to area EG D406 appear possible, but the Ministry of Defence and Office for Nuclear Regulation should be consulted by the applicant to consider this further during licensing.

C.7.21 This site therefore passes these criteria.

Policy notes

C.7.22 See Section 5.4 of EN-1 on Civil and Military Aviation and Defence Interests.

C.7.23 Regarding the previous use of Silecroft Range and the on and off site survey of potential hazards, see Part 3 of this NPS on the relationship with the regulators.

D1: Flooding, storm surge and tsunami

Analysis

Flood Zones

C.7.24 The entire site is located in Flood Zone 1, low probability. This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%)[194]. The Appraisal of Sustainability identified a relatively low risk of flooding due to rising sea levels[195]. Mitigation may be possible through appropriate design and construction of defences, taking account of coastal processes, hydrodynamics and sediment transport. The Environment Agency has advised that based on the current understanding of the flood risk in this area it is reasonable to conclude that any new nuclear power station on the site could be protected against flood risk throughout its lifetime, including the potential effects of climate change, storm surge and tsunami. This takes into account possible countermeasures.

194 See PPS25 for a full definition of the Flood Zones and what they cover: *Planning Policy Statement 25: Development and Flood Risk*, December 2006, Annex D, pp.22-25. See Section 3.7 of this NPS for information on the sequential approach that the Government has taken to flood risk in the Strategic Siting Assessment.

195 DECC, *Appraisal of Sustainability site report for Sellafield,* October 2010, www.energynpsconsultation.decc.gov.uk

Sea level rise and the effects of climate change

C.7.25 Responses were concerned about how spent fuel stores could be protected from the possible effects of climate change. Waste will be stored in safe and secure interim storage facilities until a geological disposal facility becomes available. It is currently anticipated that disposal of new build wastes would begin once disposal of legacy wastes is completed. Geological disposal of higher activity waste from new nuclear power stations is currently expected to be available for new build waste from around 2130[196].

C.7.26 The Environment Agency's assessment includes a consideration of sea level rise based on UKCP09 UK climate projections[197]. It is based on a consideration of the capacity of nominated sites to withstand flood risk and coastal erosion including the potential effects of climate change using modelling data that looks ahead to 2100. Predictions of potential climate change effects become increasingly less certain the further into the future that they extend. However, climate change projections will continue to be refined and, as time passes, will project further into the future. As such, should greater future impact be predicted, this should be identified well in advance, giving time for appropriate actions to be taken to address those impacts.

C.7.27 The regulators have also examined the adaptability of the sites to potential changes in flood hazard and are satisfied that additional safeguards are in place to ensure that only suitable sites achieve development and ongoing operational consent. This will also be reviewed in more detail as part of the planning and licensing stage and as part of the Flood Risk Assessment that applicants must undertake in conjunction with their applications to the Infrastructure Planning Commission (IPC). Should sites achieve development consent, their capacity to withstand potential climate change will remain under consideration throughout the life of the nuclear power station. Once licensed, as part of the site licensing conditions, the licensee must review their safety case at regular intervals (typically on a ten yearly

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196 On the assumption that spent fuel will be stored on-site until it can be disposed of, the key factors in determining the duration of on-site storage are the availability of a geological disposal facility (GDF) and the time required for the spent fuel to cool sufficiently for disposal in a GDF. The Nuclear Decommissioning Authority (NDA's) current indicative timetable anticipates a GDF being available to take spent fuel from new nuclear power stations from around 2130, although the future optimisation of plans for the implementation of geological disposal and the expected inventory for disposal indications may provide potential to bring forward this date. Optimisation work will also explore options for reducing the cooling time required for spent fuel prior to disposal. The Government will expect operators to ensure their waste is disposable when a GDF is anticipated to be available to take the waste. See Section B.4 of this NPS for more detail. An indicative timeline for Geological Disposal can be found at http://www.decc.gov.uk/assets/decc/What%20we%20do/UK%20energy%20supply/Energy%20mix/Nuclear/geological-disposal-board/982-geological-disposal-timeline.pdf

197 http://ukclimateprojections.defra.gov.uk/

basis). This review will take the most recent climate change projections into account and allow the necessary modifications to flood defences and/or operating arrangements to be undertaken. The objective of the review is to compare the safety case of the site against modern standards to see if there are reasonably practicable improvements that could be made, to ensure that the plant is safe to continue to operate, including spent fuel and radioactive waste storage for the next defined period.

Other points

C.7.28 Some responses were concerned about the proximity of the site to a floodplain. The Environment Agency has noted that there is flood risk from the River Ehen to the east of the site boundary. There are areas of Flood Zone 2, medium probability, and Flood Zone 3, high probability, adjacent to the eastern boundary of the site. However, the Environment Agency has advised that the site could potentially be protected. It has also advised that mitigation measures are unlikely to have an impact elsewhere.

C.7.29 During the flooding events of November 2009 the Environment Agency did not receive any reports of on-site flooding at the site. In the wider area, the Environment Agency has advised that the A595 was affected in a number of places during the floods. Water was across the road to the North at Egremont. This could affect ingress and egress to the site. Many other smaller roads were also affected, and further consideration would be expected at the detailed planning stage, if specific proposals come forward. The Office for Nuclear Regulation has advised that the bridge at Holmrook, 5 miles south of the Sellafield site, was closed for five days and effectively cut off the southern route for evacuation should that have needed to be necessary for an off-site emergency at Sellafield. However, the northern route from Sellafield along the A595 was unaffected by the flooding and remained available for evacuation under the emergency plan, such that throughout the period of the extreme weather an evacuation route for Sellafield existed. The efficacy of evacuation routes is a factor that would be taken into account by the local emergency planning authorities and by the Office for Nuclear Regulation in the event that a proposal was brought forward for development of the site.

C.7.30 The Environment Agency has noted for all nominated sites that protecting the site from flood risk now and in the future prevents the coastline from changing and adapting naturally.

Assessment

C.7.31 Given the low risk of flooding and the potential to protect the site, this site passes this criterion. This takes into account in particular the Environment Agency advice that it is reasonable to conclude at a strategic level, that any likely power station development within the site boundary can be protected against flood risk throughout its lifetime, including the potential effects of

climate change, storm surge and tsunami, taking into account possible countermeasures and mitigating actions.

Policy notes

C.7.32 See Section 5.7 of EN-1 and Section 3.7 of this NPS on flood risk. D2: Coastal processes.

C.7.33 Any potential flood risk assessment should include consideration of fluvial flood risk from the River Ehen.

C.7.34 See Section 3.6 of this NPS on flags for local consideration[198]. The applicant should consider the events of the November 2009 floods when considering emergency planning at this site with the Office for Nuclear Regulation and the Emergency Planning Authority.

D2: Coastal processes

Analysis

C.7.35 The Environment Agency has advised that development at the site could avoid or mitigate the effects of coastal erosion or other landscape change scenarios throughout its lifetime, including the potential effects of climate change.

C.7.36 The Environment Agency has advised that, based on current understanding of coastal erosion in this area there is no technical reason that would prevent the site being protected or mitigated from the effects of coastal erosion.

C.7.37 The Appraisal of Sustainability has noted that the nominated site is not currently situated in an area that the Environment Agency considers to be at risk from coastal flooding, but finds that upgraded defences may be required to counteract coastal retreat as a result of longer term climate change impacts on sea-level rise. The Appraisal of Sustainability finds that these defences have the potential to modify existing coastal hydrodynamics and associated movement of sediment, which may have secondary effects on marine ecosystem structure and functioning. However, it also finds that the use of an appropriate design, construction and management techniques and a full understanding of the hydrodynamics and sediment transport within the coastal zone could minimise the potential effects.

198 Flags for Local Consideration are siting criteria that were identified through the SSA consultation in 2008, but which (usually due to the need for detailed site-specific investigations and data) would be more appropriately assessed at the project level.

C.7.38 There was a concern in responses about the impact on the local coastal environment from coastal defences, although the presence of existing infrastructure at this site was also noted. The Appraisal of Sustainability also finds that any new engineering works on the coastline will interfere with the stability of the coastline and the sediment transport regime and could cause accelerated erosion at the site, cause erosion up or down drift of the site and possibly impact on the marine protected areas. If upgraded defences were required these may have the potential to modify existing coastal hydrodynamics and associated movement of sediment, which may have secondary effects on marine ecosystem structure and functioning. However, the Appraisal of Sustainability also found that the use of an appropriate design, construction and management techniques and a full understanding of the hydrodynamics of the coastal zone could minimise potential effects.

C.7.39 Responses expressed concern that a change in coastal processes could impact on the River Ehen estuary and therefore impact on the freshwater River Ehen Site of Special Scientific Interest (SSSI) and Special Area of Conservation (SAC) via indirect impacts on migratory fish. The Habitats Regulation Assessment report for Sellafield states that there is the potential for obstruction to the path of migratory fish at the River Ehen, which is located approximately 7.7km from the site. It also makes clear that the impacts should be considered further should an application come forward[199]. Guidance to the IPC when considering any potential change to coastal processes and possible effects is in Part 5 of EN-1. This states that, where relevant, applicants should undertake coastal geomorphological and sediment transfer modelling to predict and understand impacts and help identify relevant mitigating or compensatory measures.

Assessment

C.7.40 This site passes this criterion. Based on the advice above it is reasonable to conclude that a nuclear power station at the site could be protected against coastal erosion, including the effects of climate change, for the lifetime of the site. Mitigation of the effects of coastal processes may be possible through appropriate design and construction of defences. An applicant's proposals would be considered in conjunction with the guidance in EN-1 and this NPS on coastal processes.

Policy notes

C.7.41 See the relevant guidance in EN-1 including Section 5.5 on coastal change, and the relevant guidance in Part 3 of this NPS including that on coastal change and on flood risk.

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199 DECC, *Habitats Regulations Report for Sellafield.* October 2010. www.energynpsconsultation.decc.gov.uk, pg 13

D3: Proximity to hazardous industrial facilities and operations

Analysis

C.7.42 The Office for Nuclear Regulation has advised that it is reasonable to conclude, at a strategic level, that any likely power station development within the nominated site boundary can be protected against risk arising from proximity to hazardous facilities throughout its lifetime, taking into account possible countermeasures.

C.7.43 The Office for Nuclear Regulation has advised that the adjacent Sellafield nuclear licensed site is designated a 'Lower tier' COMAH establishment[200]. There are no formal planning consultation zones, but the Office for Nuclear Regulation has advised that it will utilise a conservative interim planning advice zone set at 1km radius from the COMAH establishment. The existing Sellafield nuclear licensed site holds hazardous substances consent under the Planning Hazardous Substances Act 1990 and the Planning (Hazardous Substances) Regulations 1992 as amended by the planning (Control of Major – Accident Hazards) Regulations 1999. This legislation is administered by Copeland Borough Council who will be consulted and provide advice during the more detailed planning stages, and if necessary may consult the Office for Nuclear Regualtion further about the location of certain buildings within the nominated site, and where necessary the scope for the licence applicant to revise their building layouts accordingly.

C.7.44 The proximity to the existing Sellafield site was raised in responses, particularly with regard to the risk of accident at the Sellafield site and the knock-on effect this could have for maintaining operational safety at a new power station. The Government notes the existence of a lower tier COMAH establishment on the adjacent Sellafield licensed nuclear site. Any new power station nearby would be required to take into account reasonably foreseeable accidents at a neighbouring site in the on-site emergency plan. Although risks are posed by legacy nuclear facilities at Sellafield, the Office for Nuclear Regulation is satisfied that Sellafield Limited is taking reasonably practicable steps to reduce these risks. These facilities have not been judged by the Office for Nuclear Regulation to pose an unacceptable risk to other operating nuclear facilities on that site. As any nuclear power station on the nominated site would be at a greater distance it would thus be at an even lower risk from these facilities.

C.7.45 The Office for Nuclear Regulation has advised that during licensing the applicant will also need to take account of the need for countermeasures to protect nuclear operations from any hazards and risks from any nearby

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200 Under the Planning (Control of Major Accident Hazards) Regulations 1999. See http://www.hse.gov.uk/comah/background/comah99.htm# for more information.

notified major hazard pipelines, based on information from the relevant pipeline operators about their routes and fluids being conveyed.

Assessment

C.7.46 This site passes this criterion. Given the likely low level of the risk posed by the existing installation at Sellafield, the Government does not believe that these considerations affect the potential strategic suitability of the site. It is therefore reasonable to conclude that any likely power station development within the nominated site boundary can be protected against risk arising from proximity to hazardous facilities throughout its lifetime, taking into account possible countermeasures.

C.7.47 As part of their assessment of a proposed power station regulators consider the developer's estimation of the threats posed to the site by nearby hazardous facilities and any proposed mitigating action.

Policy notes

C.7.48 See Section 4.12 of EN-1.The applicant should demonstrate that it has consulted the Local Planning Authority where appropriate.

D4: Proximity to civil aircraft movements

Analysis

C.7.49 The Civil Aviation Authority has advised that it is potentially reasonable to conclude that any likely nuclear power station development within the nominated site boundary can be protected against risks from civil aircraft movement. The Office for Nuclear Regulation has agreed with this advice. Nuclear power stations in the UK receive some protection from aviation activity through the establishment of a Restricted Area at each individual station. This is established by legislation[201]. Typically, such Restricted Areas have a radius of 2 nautical miles and extend vertically to 2000 feet above the surface. Any aviation activity within a Restricted Area is limited to that specifically permitted by the legislation.

C.7.50 The existing Sellafield nuclear installation has an associated Restricted Area. The Civil Aviation Authority has advised that a Restricted Area around the nominated site (or an amendment to the existing Restricted Area) could provide a similar level of protection from civil aircraft movements. Such a Restricted Area would partially overlap the existing Restricted Area associated with the Sellafield nuclear installation. The current Statutory Instrument allows for helicopter activity associated with

201 In accordance with Statutory Instrument 2007 No 1929 (The Air Navigation (Restriction of Flying) (Nuclear Installations) Regulations 2007).

the nuclear installation. Any amended Statutory Instrument may need to consider such activity.

C.7.51 The Civil Aviation Authority has also advised that it is potentially reasonable to conclude that neighbouring aerodromes and air traffic control areas can mitigate any effects arising from the Restricted Area around the nominated nuclear power site. In doing so the Civil Aviation Authority has noted that it is not anticipated that any new or amended Restricted Area established in association with the proposed nuclear installation would impact upon local aerodrome operations; that there are no known (i.e. marked on Civil Aviation Authority approved charts or promulgated in the UK Aeronautical Information Publication) civilian landing sites in such proximity to the proposed nuclear installation that a new or amended Restricted Area would have a material impact on associated operations; and that the current establishment of the existing Sellafield Restricted Area is such that the impact of a new or amended Restricted Area (as described above) upon civil aircraft in transit through local airspace is likely to be negligible.

Assessment

C.7.52 This site meets this criterion. Given the advice above it is reasonable to conclude that any likely nuclear power station development within the nominated site boundary can be protected against risks from civil aircraft movement, and that the effects on air traffic and aerodromes can be potentially mitigated.

Policy notes

C.7.53 See the relevant guidance in EN-1, including that on civil and military aviation and defence interests. See the relevant guidance in Part 3 of this NPS, including that on proximity to aircraft movements. See the relevant guidance in EN-1, including that on civil and military aviation and defence interests.

For D5 see C2

D6: Internationally designated sites of ecological importance[202]

Analysis

C.7.54 Responses focused on a number of sites including the River Ehen SAC. Some concern was cited that abstraction of cooling water from Wastwater and the River Ehen would have adverse effects on the internationally

202 These are occasionally referred to as “European Sites”, “European designated sites”, or “sites of European importance”. See entry D6 in the table “The SSA criteria and how the sites were assessed” at the end of this annex for details of these designations and what they cover.

designated sites and species including on the pearl mussels. The Environment Agency has advised that any proposal for freshwater indirect cooling would need to be carefully considered as it has advised that the demand is likely to be large, the rivers concerned are highly rainfall dependent, and some carry important nature conservation designations.

C.7.55 There were also concerns about the effect on the natterjack toad, particularly of construction of associated development such as a marine landing facility. The Sellafield Appraisal of Sustainability states that there are records of natterjack toads being present within 10km of the nominated site. If, following detailed site surveys, natterjack toads are confirmed as being present within the nominated site, it is likely a detailed mitigation strategy would be required and it would be necessary to avoid, where possible, any direct impacts on this species through alterations to site design and layout. If mitigation through avoidance is not feasible, for example, due to widespread distribution across the nominated site, measures to reduce the impacts would be necessary.

C.7.56 There was some concern that cooling could have an impact on designated sites in the vicinity due to changes in water temperature and the use of biocides. Responses cited possible effects on river, sea and brook lamprey and other specifies, and the Duddon Estuary, Drigg Coast, Upper Solway Floats and Marshes, Solway Firth SAC, River Derwent and Bassentwaite Lake SAC, and Rivers Ehen and Eden SAC. There was concern that these sites had not been considered in the Habitats Regulations Assessment[203] despite species which are an interest feature of the designations using the coastline near Sellafield.

C.7.57 The Habitats Regulations Assessment has not scoped in European designated sites beyond 20km of the site boundary on Natural England's Nature map unless it is considered that effects may arise through, for example, hydrological connectivity. This area of search reflects guidance recommendations and this approach was agreed with the Government's statutory advisors on nature conservation matters, Natural England, and the Countryside Council for Wales. Morecambe Bay SAC and Special Protection Area (SPA)/ Ramsar, Duddon Estuary SPA/Ramsar, Upper Solway Flats and Marshes SPA and Ramsar, Solway Firth SAC, River Derwent and Bassenthwaite Lake SAC and River Eden SAC all lie further than 20km from the nominated site. Cooling is discussed in more detail under criterion D10.

C.7.58 The Appraisal of Sustainability[204] identified that the potential for adverse effects on the sites and species considered to be of European nature conservation importance means that significant strategic effects on

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203 See footnote 199

204 See footnote 195

biodiversity cannot be ruled out at this stage of the appraisal. The findings of the Appraisal of Sustainability on European Sites are drawn from the Habitats Regulations Assessment for Sellafield. The Habitats Regulations Assessment notes that its conclusions are limited by the strategic nature of the assessment process and the information available, which does not generally allow for a definitive prediction of effects on the European Sites considered. The Habitats Regulations Assessment has concluded that at this strategic level it cannot rule out the potential for adverse effects on four European Sites (Drigg Coast SAC, River Ehen SAC, Wast Water SAC, River Derwent and Bassenthwaite Lake SAC) through potential impacts on water resources and quality, habitat/species loss and fragmentation, coastal squeeze and air quality.

C.7.59 The Habitats Regulations Assessment has proposed a suite of avoidance and mitigation measures to be considered as part of the project level Habitats Regulations Assessment. At this stage, it is assessed that the effective implementation of this proposed suite of measures may address adverse effects, but that it cannot be concluded with certainty that adverse effects on European Site Integrity will be mitigated as project level work is required to determine the outcomes.

Assessment

C.7.60 The Government notes the scope for avoidance and mitigation identified in the Habitats Regulations Assessment, and the need for more detailed studies should an application for development consent come forward. Given that the Habitats Regulations Assessment has not been able to rule out adverse impacts on sites of European nature conservation importance, the Government has carefully considered against this criterion whether it is appropriate to include this site in this NPS.

C.7.61 Annex A of this NPS sets out that the Government has concluded that there is an Imperative Reason of Overriding Public Interest that favours the inclusion of this site in the Nuclear NPS despite the inability to rule out adverse effects on European Sites at this stage. This takes into account the need for sites to be available for potential deployment by the end of 2025, the lack of alternatives, and the consideration given to compensatory measures. This site therefore passes this criterion.

Policy notes

C.7.62 See the relevant guidance in EN-1, including that on the Environmental Statement, Habitats Regulations Assessment and biodiversity and geological conservation. See the relevant guidance in Part 3 of this NPS, including that on biodiversity and geological conservation.

C.7.63 The IPC should also refer to the Appraisal of Sustainability and Habitats Regulations Assessment for Sellafield and consider whether the applicant's

proposals have sufficiently taken into account the issues identified, where they are still relevant.

D7: Nationally designated sites of ecological importance

Analysis

C.7.64 The Appraisal of Sustainability identified that the potential for adverse effects on the sites and species considered to be of national nature conservation importance means that significant strategic effects on biodiversity cannot be ruled out at this stage of the appraisal. The Appraisal of Sustainability has identified the following SSSIs where it finds that significant effects may occur: Drigg Coast SSSI; River Ehen (Ennerdale Water to Keekle Confluence) SSSI; Low Church Moss SSSI; Hallsenna Moor SSSI; St. Bees Head SSSI.

C.7.65 The Appraisal of Sustainability has also identified potential for the mitigation of biodiversity effects on sites of national conservation importance, including the avoidance of Low Church Moss SSSI, and careful siting of the development.

C.7.66 Responses asked why Church Moss SSSI had been included within the nomination given that the site was so large. To reduce the likelihood of further land being needed, and increase the usability of their site, nominators were encouraged to ensure that the area nominated included within it all likely actual site plans and all reasonable variations to those plans. It is therefore possible that the nominated area will be larger than the actual site plan that will be put forward, in due course, for development consent. The Appraisal of Sustainability noted that direct impacts to Low Church Moss SSSI may occur as this ecological site is partially within the nomination site boundary, but that they could be avoided through careful siting of the development.

C.7.67 Responses also raised that the site includes Sellafield Tarn which is a County Wildlife Site. The SSA, as a strategic level assessment, has considered impacts on internationally and nationally designated sites of ecological importance, such as SSSIs. Nature and wildlife reserves in local areas may not have statutory status but the Government recognises they can be sites of local importance. The Government considers that impacts upon local sites are more appropriately addressed by the IPC at the development consent stage when Environmental Impact Assessments are undertaken and project level information is available.

Assessment

C.7.68 The Government notes that the Appraisal of Sustainability has identified potential impacts on nationally designated sites of ecological importance which it considers of strategic significance. Given the scope for mitigation of biodiversity effects identified in the Appraisal of Sustainability for sites of

national importance it is reasonable to conclude that it may be possible to avoid or mitigate impacts.

C.7.69 The Government recognises that whilst it is reasonable to reach this conclusion, there is a risk that there could be remaining effects on nationally designated sites. However, there is a need to ensure sufficient sites are available for development to meet the Government's energy policy objectives, as described in Part 2 of this NPS. In view of this and in view of the limited number of potentially suitable sites, the Government does not think the issues in relation to this criterion are sufficient to justify not including the site in this NPS. The Government has also noted the fact that there will be further detailed assessment of any proposal for the site at project level.

C.7.70 This site passes this criterion.

Policy notes

C.7.71 See the relevant guidance in EN-1, including that on the Environmental Statement and biodiversity and geological conservation. See the relevant guidance in Part 3 of this NPS, including that on biodiversity and geological conservation.

C.7.72 The IPC should also refer to the Appraisal of Sustainability for Sellafield and consider whether the applicant's proposals have sufficiently taken into account the issues identified, where they are still relevant.

D8: Areas of amenity, cultural heritage and landscape value

Analysis

C.7.73 Responses raised visual impacts on the Lake District National Park. Some of these responses were concerned that a new development would exacerbate the visual impact of the existing Sellafield facility. However, other responses felt that as the nominated site lies adjacent to the existing nuclear facilities it should be more readily assimilated in the wider landscape, and there would be potential to concentrate buildings closer to existing visual disturbance in the landscape.

C.7.74 The nominator[205] notes that the existing Sellafield nuclear complex is the dominant physical feature in the surrounding area, and is likely to remain so for several decades. The nominator states that the 'new build' site would be "read" as part of this single complex. The complex constitutes a relatively confined, densely developed area, surrounded by largely undeveloped land, and this would continue. It goes on to note that "within the receiving landscape and the local surrounding area there is limited

205 The Nuclear Decommissioning Authority (NDA)

opportunity for the existing landscape to offer screening either through topography or vegetation. Mitigation measures to reduce visual effects could be achieved through sensitive development, increasing local tree cover where possible, the use of colour schemes that blend with the background, and creation of new habitat areas"[206].

C.7.75 The Appraisal of Sustainability has considered the potential impact on landscape and identified potential adverse effects. These include lasting direct and indirect adverse landscape and visual impacts on the surrounding area, including the Lake District National Park. The Appraisal of Sustainability notes that overall, the new power station would be seen in the context of the existing large scale nuclear complex, prior to decommissioning. However, the Appraisal of Sustainability has found that further development is still likely to lead to a perceptible deterioration in some views, which would not be able to be fully mitigated, given the scale of possible new buildings and infrastructure. However, it finds that the direct effects (with the exception of potential additional grid connectivity) will be felt primarily at the local level.

C.7.76 The Appraisal of Sustainability has also identified potential adverse effects on the settings of cultural heritage features of regional and national importance, as well as on buried archaeology of potentially high importance. The effects on cultural heritage features arise from potential impacts on settings of the features, depending on the distance and sight lines and any mitigation. The Appendices of the Appraisal of Sustainability[207] list the cultural features in the area including the nearest scheduled monument consisting of two high cross shafts in St. Bridget's Churchyard which lies within 1km; 2 Grade I and 9 Grade II* listed buildings within an approximate distance of 5km of the nominated site; Conservation Areas exist at Beckermet and Egremont; 33 further Grade II listed buildings within an approximate 5km distance of the nominated site[208].

C.7.77 The Appraisal of Sustainability notes that Prehistoric or Roman flints have been found within the nominated site and a Roman occupation site is known within close vicinity and that the presence of these features indicates prehistoric and historic activity within and close to the nominated site. As such the Appraisal of Sustainability concludes that the area is likely

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206 See www.energynpsconsultation.decc.gov.uk for the nomination documents for Sellafield, and in particular information on amenity, cultural heritage and landscape value.

207 See the *Appendices to Appraisal of Sustainability site report for Sellafield*, October 2010, www.energynpsconsultation.decc.gov.uk

208 Grade I buildings are of exceptional interest, sometimes considered to be internationally important. Grade II* buildings are particularly important buildings of more than special interest. Grade II buildings are nationally important and of special interest. See http://www.english-heritage.org.uk.

to be considered of at least local to regional archaeological importance. However, the Appraisal of Sustainability finds that there is a likelihood that these effects can be mitigated and that further detailed assessment at project level will be required[209].

C.7.78 The Appraisal of Sustainability has also identified that there are likely to be cumulative effects associated with other onshore and offshore energy projects.

Assessment

C.7.79 In making this assessment the Government has had regard to the purposes of the designation of the National Park in conserving and enhancing the natural beauty, wildlife and cultural heritage of the park and promoting opportunities for the understanding and enjoyment of the special qualities of those areas by the public.

C.7.80 The nominator has proposed potential mitigating actions to minimise impacts on the National Park. However, the Appraisal of Sustainability has assessed that visual impacts will be highly likely given the existing undeveloped nature of the nominated site, the scale of new development and the potential need for associated off-site grid connection infrastructure.

C.7.81 The nominated site is, at its closest point, within 1.5km of the Lake District National Park. The Appraisal of Sustainability found that the existing nuclear facilities at nearby Sellafield already make a prominent feature in views from western areas of the National Park and more distant high fells, such as Scafell Pike. However, the dominance of Sellafield does mean that additional setting effects are likely to be read within that context, and as such are unlikely to be excessively detrimental. Development on the Sellafield complex would be close to the existing industrial structures and therefore less likely to increase the visual spread of the development.

C.7.82 The Government therefore finds that whilst impacts upon the Lake District National Park will need to be carefully considered, if appropriately designed and sited any new nuclear power station at Sellafield could be seen as an extension to existing development given the proximity of the nominated site to the existing Sellafield facilities. In the specific circumstances at Sellafield, the Government has, having reviewed the evidence including the outputs of the public consultation, concluded that the site is potentially suitable against this criterion. This takes into account the context of the existing Sellafield site and the significance of the effects, the fact that the nature, scope, and scale of any effect is currently uncertain and is dependent on the exact form of development proposed; and that there is

209 See footnote 207

some scope for a developer and the IPC to explore in detail minimisation, avoidance and mitigation of adverse effects. Given this the potential effect of development does not outweigh the need for sites and the lack of alternatives outlined in Part 2 of this NPS.

C.7.83 The potential for remaining effects can only be fully assessed when detailed plans come forward. This is because they depend on a range of factors including the proposals for minimisation and mitigation, the cooling technology proposed and location of transmission infrastructure, and the relevant other development in the area to be factored when considering cumulative effects.

C.7.84 Applications for development consent for nationally significant grid infrastructure will be considered by the IPC within the framework of the Electricity Networks NPS (EN-5). Applicants are required to consult local communities about their plans before submitting them to the IPC.

Policy notes

C.7.85 See the relevant guidance in EN-1 and Part 3 of this NPS, including that on landscape and visual impacts. The IPC should also refer to the Appraisal of Sustainability and the applicant's proposals for Sellafield and consider whether the applicant's proposals sufficiently avoid or mitigate potential impacts where they are still relevant.

C.7.86 It should also be noted that whilst the Appraisal of Sustainability has noted the potential strategic environmental and sustainability implications of transmission infrastructure as far as possible within the information available, detailed environmental assessment should be made by the applicant at the IPC stage. This would be considered in conjunction with the Electricity Networks NPS (EN-5).

D9: Size of site to accommodate operation

Analysis

C.7.87 The nominated site is approximately 250 hectares. The nominated land has a number of roads or footpaths bisecting it, including two roads that provide access to the existing Sellafield site. It is a security requirement that the licence applicant has exclusive rights of access to, and control of, a civil licensed nuclear site and that it is not therefore bisected by any public rights of way.

C.7.88 The Office for Nuclear Regulation has advised that, unless the roads bisecting the nominated sites are substantially realigned, there appears to be insufficient land to provide effective defence-in-depth for a nuclear reactor, including its associated turbine hall, spent fuel and intermediate level waste stores, in the area defined by grid references 302270, 504400, 302520, 505550 (roundabout), and 303050, 505300 back along the

existing Sellafield Site perimeter running south and west (see map at the end of this annex).

C.7.89 Whilst these particular areas have insufficient land to provide defence-in-depth, the Office for Nuclear Regulation has confirmed that otherwise there is sufficient area within the nominated boundary to house and provide sufficient defence-in-depth for essential infrastructure.

Assessment

C.7.90 Although the Office for Nuclear Regulation has identified areas of the nominated site cannot provide sufficient defence-in-depth (unless roads are realigned), based on the advice of the Office for Nuclear Regulation it is reasonable to conclude that there is enough land within the boundary nominated to safely and securely operate at least one new nuclear power station, including the safe and secure storage of all the spent fuel and intermediate level waste produced through operation, and from decommissioning, on the site of the station until it can be sent for disposal in a geological disposal facility.

C.7.91 Responses were received stating that the site could accommodate more reactors than proposed by the developer and that the site should be developed to its full potential in order to maximize the socio-economic benefit to the area. The SSA did not require nominators to specify how many reactors may be developed at a site. Section 3.4 of this NPS sets out that whilst the assessment was carried out on the basis of one reactor. this does not mean that more than one reactor could not be built at any site. The impacts of all of the reactors proposed for a site would need to be considered by the IPC should such an application come forward. The Infrastructure Planning Commission would also consider socio- economic effects using guidance in Part 3 of EN-6 and Part 5 of EN-1.

Policy notes

C.7.92 The safety and security of a nuclear power station is considered by the Office for Nuclear Regulation as part of the licensing regime. See Part 3 of this NPS for guidance on the relationship between the regulatory framework and the planning regime.

C.7.93 See Section 5.10 of EN-1 (Land Use including open space, green infrastructure and green belt).

D10: Access to suitable sources of cooling

Analysis

C.7.94 The nominator considers that both direct or indirect cooling, using sea or fresh water, or a combination of both types of water is possible and has concluded that either seaward or inland cooling is feasible. However,

based on work so far, their initial assessment is that direct cooling, using seawater at a seaward site is likely to be the more viable option[210].

C.7.95 The Environment Agency has advised that it is potentially reasonable to conclude that there is access to potentially suitable sources of cooling at the site. However, it has advised that any proposal for freshwater indirect cooling would need to be carefully considered. The Environment Agency are concerned that the demand is likely to be large, the rivers concerned are highly rainfall dependent, and some carry high nature conservation designations. The Environment Agency has also noted that the needs of migratory salmonids and pearl mussels would need to be fully assessed, and in addition there could be in-combination effects as surface water abstraction already takes place from these systems for other purposes such as public supply.

C.7.96 The Appraisal of Sustainability for Sellafield has noted that returning cooling water off the Cumbria Coast at elevated temperatures could potentially bring significant environmental and ecological impacts, particularly on aquatic biodiversity. The Environment Agency has noted that there are important nursery grounds for both bass and sole on this coast as well as large populations of migratory salmonids which would need to be considered in any application for seawater cooling.

C.7.97 Some responses were concerned about the potential impact on the water quality of the Irish Sea from Sellafield. A number of these responses related to the cumulative impact of Braystones and Kirksanton, which were nominated but which are not included within the NPS, but some were also concerned about the in combination effects with existing operations at Sellafield, and Wylfa. Some responses were concerned that the impacts of radioactive discharges would be felt more widely possibly affecting the Isle of Man or the Irish Republic, posing a threat to the fishing industry and tourism. The focus of the Appraisal of Sustainability was on the effects associated with England and Wales. However, consideration was given to any significant effects for the rest of the UK and transboundary effects. It was concluded that significant transboundary effects are unlikely.

C.7.98 Routine radioactive discharges from new nuclear power stations will need to be within authorised limits. The Environment Agency works with operators to ensure that routine radioactive discharges are not only within statutory limits but as low as reasonably practicable. The UK is also a contracting party to the OSPAR Convention on the Protection of the Marine Environment of the North East Atlantic. The revised radioactive discharges strategy published in 2009[211] demonstrates how the UK is continuing to

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210 See footnote 206

211 DECC, *UK strategy for radioactive discharges*, 2009, http://decc.gov.uk/en/content/cms/what_we_do/uk_supply/energy_mix/nuclear/issues/radioactivity/radioactivity.aspx

meet the objectives of the Convention's Radioactive Substances Strategy. This includes the objective of progressive and substantive reductions in concentration of radionuclides in the marine environment resulting from discharges, so that by 2020 they add close to zero to historic levels.

C.7.99 An operator needs an Environmental Permit issued by the Environment Agency for the discharge of cooling water to controlled waters[212]. The Environment Agency will consider the acceptability of any environmental impacts before deciding if a permit should be granted. The permit will require operators to meet the discharge limits that are set by the Environment Agency. In setting the discharge limits, the Environment Agency will be mindful of both the existing water quality and environmental standards, for example, statutory environmental quality standards (EQS). Operators will need to satisfy the Agency that they can meet the limits set and compliance with discharge limits will be monitored during operation.

C.7.100 The location of the point of abstraction of any cooling water and type of source of supply from which it is taken will determine whether consideration is needed for an abstraction and or impoundment licence. If a licence is required, and granted it will be subject to conditions to protect both the environment and existing protected water rights and legal water interests. Abstractors would need to comply with such conditions and will be monitored. In addition the NPS stipulates that there must be a project level Habitats Regulations Assessment which would consider the impact of the abstraction and discharge of cooling water on any sites of international ecological importance.

C.7.101 The Environment Agency has advised that to assess the impact fully will require detailed proposals, detailed environmental and physical surveys and modelling of impacts. A report from the Environment Agency on cooling[213] analysed the issue of entrainment, entrapment and impingement of fish in direct cooling systems in detail. The report made several suggestions for mitigation of this issue which could be deployed by the developer. These include location and design of intake structures and screens and the use of fish deterrent and fish recovery return systems. The Environment Agency has advised that each site will be considered individually.

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212 The Environmental Permitting (England and Wales) Regulations 2010 came into force on 6 April 2010 and cover all water discharge activities. Water discharge consents will become Environmental Permits, and applications for new discharges will fall under the new regulations.

213 Environment Agency, *Cooling Water Options for the New Generation of Nuclear Power Stations in the UK,* 2010, http://publications.environment-agency.gov.uk/epages/eapublications.storefront/4d95b71100342058273fc0a802960654/Product/View/SCHO0610BSOT&2DE&2DE

Assessment

C.7.102 Based on the findings of the Appraisal of Sustainability and the Environment Agency it is reasonable to conclude that there is access to suitable sources of cooling at the site although any proposal for freshwater cooling from the River Ehen would clearly need to be carefully considered.

C.7.103 The site passes this criterion. Detailed modelling as part of the licensing process will give greater clarity about the acceptability of impacts in the light of the cooling technology that is proposed.

Policy notes

C.7.104 See the relevant guidance in EN-1, including Section 5.3 on biodiversity and Section 5.5 on coastal change, given that a new development may require offshore infrastructure for intake and outfall.

C.7.105 See the relevant guidance in Part 3 of this NPS, including that on water quality and resources.

C.7.106 See Part 3 of this NPS for guidance on the relationship between the regulatory framework and the planning regime.

Appraisal of Sustainability and Habitats Regulations Assessment for Sellafield

C.7.107 The Planning Act 2008[214] requires an Appraisal of Sustainability to be carried out for all NPSs. The purpose of an Appraisal of Sustainability is to consider the social, economic and environmental impacts of the policy and to suggest possibilities for improving the sustainability of the NPS. The purpose of the Appraisal of Sustainability for Sellafield is to examine the potential positive and negative effects of the nominated site, identify the significance of these effects, and suggest any mitigation possibilities.

C.7.108 The NPS has also been assessed in accordance with the European Habitats Directive. That assessment (the "Habitats Regulations Assessment") tests whether a plan or project could have an adverse effect on the integrity of European Sites of nature conservation importance. A Habitats Regulations Assessment was carried out on the Sellafield site. The key findings of the Sellafield Appraisal of Sustainability and Habitats Regulations Assessment highlight areas of significance on, amongst other things:

i) potential negative effects on three protected nature conservation sites, including the Drigg Coast and River Ehen SACs;

214 The Planning Act 2008

ii) potential effects on water quality and migratory fish in nearby coastal waters due to the abstraction and release of sea water for cooling;

iii) the risk of flooding due to rising sea levels is considered relatively low at Sellafield and existing hard flood defences are in place, which the Appraisal of Sustainability finds may require upgrading;

iv) visibility from parts of the Lake District National Park. The Appraisal of Sustainability considers that the impact could not be fully mitigated; and

v) there will be significant positive effects associated with long term employment and enhanced prosperity for communities locally. These benefits are likely to be significant at the sub-regional level if two power stations (Sellafield and Heysham) are built in the North West, in combination with other proposals for regeneration.

C.7.109 Issues i) – iv) are discussed against the SSA criteria above. Cumulative effects are discussed below.

Cumulative effects

C.7.110 The Appraisal of Sustainability for Sellafield notes that the development of a nuclear power station at the nominated site will interact with other regional plans, programmes and projects and may lead to cumulative effects. Sellafield and Heysham form a cluster of two nominated sites in the north west. There is the potential for cumulative effects if more than one nuclear power station site were developed in this area. The potential cumulative effects arise as a result of interactions between the sites due to their relative proximity and the way in which effects may act together. The cumulative effects that are assessed to be of potentially strategic significance are discussed below.

Biodiversity and ecosystems

C.7.111 The site Appraisal of Sustainability report for Sellafield identifies that the potential for major adverse effects on sites and species considered of UK-wide and European nature conservation importance means that strategic significant effects on biodiversity cannot be ruled out. The effectiveness of mitigation possibilities is uncertain and needs to be evaluated in the project level assessments. No common sites of European nature conservation importance are assessed as being potentially affected by both power stations. However, the Appraisal of Sustainability found that there may be significant adverse effects on wider biodiversity if both Sellafield and Heysham are developed, due to the prevalence of nationally designated sites at both Sellafield and Heysham sharing similar habitats or species, meaning that there is a chance that if both sites were developed and impacted on similar sites a cumulative effect could arise.

Effects on communities: population, employment and viability

C.7.112 Development at the Sellafield site is appraised as having positive effects of regional economic significance on employment and community viability. The Appraisal of Sustainability identified that there are indirect positive health effects associated with enhanced prosperity and long-term employment opportunities.

C.7.113 The cumulative positive effects of employment, community viability and health/well-being could be more significant if more than one new nuclear power station is built and the opportunities for upskilling, education, and supporting industries to the nuclear sector are developed at local and regional levels. The site Appraisal of Sustainability report notes that there may be negative effects, during the construction of any new power stations, if the development produces a local shortage of specialist construction labour. This negative effect could be increased if more than one power station is developed in the region. However, these effects may be mitigated if the education and upskilling opportunities noted above are taken and by appropriate phasing of construction.

Other aspects

C.7.114 The Appraisal of Sustainability finds that there are beneficial cumulative effects on climate change from the NPS and that these are likely to contribute to emission targets at the international and national scales, but are unlikely to be significant at the regional scale.

Conclusion on cumulative effects

C.7.115 If nuclear power stations are developed at more than one site in the region, any cumulative radiological effects would be addressed by risk assessments as part of the site licensing process.

C.7.116 Interactions between potential developments can be complex and will depend on what relevant proposals have come forward. This can only be properly assessed at the point at which an application for development consent is made.

C.7.117 Paragraph 4.2.1. of EN-1 sets out that when considering cumulative effects, the Environmental Statement that accompanies an application 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 or granted, as well as those already in existence) [215].

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215 For guidance on the assessment of cumulative effects, see, for example, Circular 02/99, *Environmental impact assessment*; or *Guidelines for the Assessment of Indirect and Cumulative*

Other issues raised during the assessment

C.7.118 This section deals with other common issues at this site that were raised in responses.

Comments on cumulative radiation doses

C.7.119 Some responses were concerned about the cumulative impact on health and radiation of more than one potential nuclear power station in an area. These concerns were generally raised about Braystones and Kirksanton (sites that were nominated that are not considered suitable), but could be taken to apply to concerns regarding the existing Sellafield facilities in conjunction with a new nuclear power station. By law the radiation to which members of the public are exposed from all sources, excluding natural sources and medical procedures, is limited to 1 mSv per year. This limit applies to the cumulative effects of planned exposures and therefore the radiation to which people living near a new nuclear power station are exposed is legally limited to 1mSv per year, taking into account exposures from any other nearby sites and any past controlled releases. The regulatory regime therefore takes into account the cumulative impact of having more than one source of radiation in a particular area.

C.7.120 The ongoing assessments of dose to members of the public are supported by a programme of environmental sampling and monitoring reported in the annual Radioactivity in Food and the Environment (RIFE) reports. Future discharges from any new nuclear power station would be assessed on the basis of the detailed proposals as and when they are formally submitted for assessment. However, the Environment Agency has advised that their preliminary assessments for the Generic Design Assessment (GDA- see also under “Terrorist threat” below) of the reactor designs indicate that doses arising from potential discharges from these reactors are well within dose limits and constraints.

C.7.121 A particular concern was raised in responses about existing radiation from Sellafield and the potential for construction (including that of cooling technology) to disturb radioactive particles on the sea bed that responses were concerned could blow over Cumbria. The presence of radioactive particles in offshore sediments, and the consequences in terms of risks to the public, are currently subject to assessment as part of a formal programme of work on Sellafield Radioactive Particles in the Environment[216]. The Environment Agency has advised that characterisation of the distribution of radioactive particles in beach sediments is well advanced in this area, and that the current level of

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Impacts as well as Impact Interactions: http://ec.europa.eu/environment/eia/eia-studies-and-reports/guidel.pdf.

216 See http://www.sellafieldsites.com/what-we-do/environment-health-safety--quality/environment/particles-in-the-environment for further information.

understanding indicates that risks to the public are very low due to a combination of relatively low hazards associated with the particles found to date, and the very low probability of members of the public ingesting or inhaling these particles which are very sparsely distributed.

C.7.122 On the basis of current information on the finding of radioactive particles on beaches near the existing Sellafield site, the Health Protection Agency (HPA) considers that no special precautionary actions are necessary at this time regarding access to or use of these beaches. However, HPA will continue to work with relevant authorities to keep the situation under investigation.

C.7.123 The consequences of a new build sea discharge disturbing contaminated sediments would be assessed as part of the Environment Agency's assessment of any specific proposals for the site.

Health

C.7.124 The Appraisal of Sustainability for Sellafield has considered strategic effects on human health and well being. The Appraisal of Sustainability looks at a range of different factors and should be referred to for a more in depth assessment.

C.7.125 The Appraisal of Sustainability has found that the rigorous system of regulation of routine discharges from any new nuclear power station at Sellafield should ensure that there are no unacceptable risks to the health of the local population under normal operating conditions.

C.7.126 The Appraisal of Sustainability also concludes that there is a very small risk of adverse health impacts arising from an accidental release of radiation but the multiple safety features within modern nuclear plants makes such an event exceedingly unlikely. Section 3.13 of this NPS (Human health and wellbeing) sets out that the risk of an accident resulting in exposure to radiation for workers, the public and the environment is very small because of the UK's strict regulatory regime. Section 3.13 should be referred to for further guidance.

C.7.127 It is possible that the presence of a nuclear power station may lead to increased stress levels in certain individuals. Overall, the Appraisal of Sustainability finds that likely enhancement in employment, community wealth, housing stock and other associated neighbourhood infrastructure should improve community well-being and health generally.

C.7.128 Responses were particularly concerned about whether there were links between nuclear power stations and cancer. This has been the subject of the work of the Committee on Medical Aspects of Radiation in the

Environment (COMARE)[217]. Its view is that there is no evidence for unusual aggregations of childhood cancers in populations living near nuclear power stations in the UK.

C.7.129 COMARE's tenth report considered the incidence of childhood cancer around nuclear installations. These were divided into nuclear power generating stations and other nuclear installations. The results for the power generating stations supported the conclusion that 'there is no evidence from this very large study that living within 25km of a nuclear generating site in Britain is associated with an increased risk of childhood cancer'.

C.7.130 In its eleventh report COMARE examined the general pattern of childhood leukaemia within Great Britain and concluded that 'the search for increased risk levels near to nuclear power generation sites shows no pattern of excess cases of childhood cancer close to the sites of these types of nuclear installations' Among its recommendations, the report said that the incidence of childhood leukaemia and other cancers in the vicinity of Sellafield and Dounreay, which are not power generating stations, was raised and should be kept under surveillance and periodic review.

C.7.131 Responses raised particular concerns about the findings of the KiKK study[218] undertaken in Germany. Following the publication of the KiKK study, COMARE requested that a reanalysis of the UK childhood cancer data used in COMARE's tenth report be carried out using the same methodology as the KiKK study as far as was possible. This reanalysis – the Bithell paper[219] – was published in December 2008. It showed that, for the UK, the conclusions of the COMARE tenth report remained valid when applying methodology closer to that of the KiKK study on the same dataset.The tenth report did however state that for other nuclear sites the situation was more complicated. The study did demonstrate corresponding

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217 COMARE is an independent scientific advisory committee providing advice on all aspects of health risk to humans exposed to natural and man-made radiation. It has, for over twenty years, investigated the incidence of childhood cancer and other cancers around nuclear sites. All reports can be found at http://www.comare.org.uk/

218 The results of the Kinderkrebs in der Umgebung von Kernkraftwerken (KiKK) study of childhood cancer in the vicinity of German nuclear power plants between 1980 and 2003 was published in 2008 by the German Childhood Cancer Registry (DKKR), based on data from and designed in consultation with the Federal Office for Radiation Protection (BfS). The KiKK study found that there was a correlation between the distance of the home from the nearest nuclear power station at the time of diagnosis and the risk of developing leukaemia before the fifth birthday. However, it also noted that the exposure to ionising radiation in the vicinity of German nuclear power stations was lower by a factor of 1,000 to 100,000 than the exposure to natural background and medical radiation, and that therefore the findings of the study could not be explained in the present state of radiobiologic and epidemiologic knowledge.

219 Bithell et al, Radiation Protection Dosimetry 2008 132(2), Childhood leukaemia near British nuclear installations: methodological issues and recent results, pp191-197: http://rpd.oxfordjournals.org/cgi/content/abstract/132/2/191

results to previously published studies that showed excesses of some types of childhood cancer. These results (excess childhood cancers in Seascale near Sellafield; in Thurso near Dounreay and around Aldermaston, Burghfield and Harwell) have been extensively discussed in previous COMARE reports.

C.7.132 In May 2011 COMARE published as its 14th report a further review of the incidence of childhood cancer around nuclear power stations, with particular reference to the KiKK study and COMARE's 10th and 11th reports. In this 14th report, COMARE found no reason to change its previous advice that there is no evidence to support the view that there is an increased risk of childhood leukaemia and other cancers in the vicinity of nuclear power stations due to radiation effects. COMARE also recommends that the Government keep a watching brief in this area.

C.7.133 Radioactive monitoring carried out in 2009 found generally low concentrations of artificial radionuclides attributable to the former Calder Hall nuclear power station in water, sediment and beach samples and in meat and seafood samples taken from around the nominated site. However, the presence in the area of other nuclear activities (two fuel reprocessing plants, decommissioning and clean-up, manufacture of mixed oxide fuel and waste treatment and storage) makes the apportioning of radiological effects in the area very difficult. In addition, a significant proportion of the radiation dose arises from enhanced concentrations of naturally occurring radionuclides from former non-nuclear industrial activity in the Sellafield area, for example, from the legacy of past discharges from a phosphate processing works in Whitehaven. Nevertheless, from this sampling, the estimated total annual dose to the public from all sources within the Sellafield area was assessed as being 28% of the dose limit for members of the public of 1mSv per year as specified in the Ionising Radiations Regulations 1999[220].

Terrorist threat

C.7.134 Some responses raised that the siting of a station close to the existing site at Sellafield could constitute an increased terrorist threat to the Cumbria coast.

C.7.135 The Government acknowledges the security concerns. However, taking all the evidence into account, we believe that the risks associated with nuclear power are small and that the existing regulatory regime is such that those risks can be effectively managed. The security of civil nuclear material and sites in the UK is regulated by the Office for Nuclear Regulation in accordance with relevant national legislation, which reflects international

220 Environment Agency, *Radioactivity In Food and the Environment* 2009 (RIFE 15) report, 2010. This monitoring is conducted annually and can be found at http://www.environment-agency.gov.uk/homeandleisure/110353.aspx.

obligations and guidelines. The Office for Nuclear Regulation places strict obligations on site operators and requires site security plans to be approved by it and for the plans to be regularly reviewed.

C.7.136 The Office for Nuclear Regulation and the Environment Agency are currently undertaking a process of Generic Design Assessment (GDA) of new nuclear reactor designs. GDA allows the generic safety, security and environmental implications of new nuclear reactor designs to be assessed up front. The GDA process takes into account all reasonably foreseeable external threats. This includes meteorological phenomena, the effects of climate and landscape change, geological disturbance, seismic activity, flooding and aircraft impact.

Transport

C.7.137 Many responses noted traffic problems associated with the existing Sellafield site, which responses said creates significant strain on the road network to the site. The A595 was frequently referred to as problematic. It was suggested that there were delays on this route when there was a trial run of the evacuation plan. Other responses made specific suggestions for improvements including a trunk road link to connect the site to the main routes further across the county.

C.7.138 The Government recognises that a new nuclear power station, both in construction and operation, may have significant impacts on both local and national transport infrastructure. At Sellafield impacts may be exacerbated by the operation of the existing facilities which place a particular strain at certain times of the day. Under the NPS system, transport access arrangements can be included as associated development and therefore submitted to the IPC for consideration along with an application for development consent for a new nuclear power station. Guidance is in Section 5.13 of EN-1. Transport, flooding and emergency planning is discussed under criterion D1.

Conclusion on the nominated site at Sellafield

C.7.139 Given that the site meets the SSA criteria, and having considered the evidence from, inter alia, the public, regulators, the Appraisal of Sustainability and Habitats Regulations Assessment site reports, the Government has concluded that the site is potentially suitable and should be in the Nuclear NPS.

C.7.140 This assessment has outlined that there are a number of areas which will require further consideration by the applicant, the IPC and/or the regulators should an application for development consent come forward, including amongst other things the impact of this proposal in combination with any other relevant nuclear power stations in the region, and in particular the effect of this on the Lake District National Park. However, the Government

has concluded that none of these factors is sufficient to prevent the site from being considered as potentially suitable.

C.8 Sizewell

Description of the location

C.8.1 The nominated site is located adjacent and to the north of Sizewell B nuclear power station near Leiston in Suffolk. It is in the civil parish of Leiston within the Suffolk Coastal District in the county of Suffolk. The grid reference of the approximate centre of the nominated site is 647300, 264100.

C.8.2 The boundary of the nominated site includes land in the Goose and Kenton Hills and a further area to the south of Sizewell A and B power stations, between Sizewell Wents and the hamlet of Sizewell. The site is within the Suffolk Coast and Heaths Area of Outstanding Natural Beauty (AONB) and includes land from the Sizewell Marshes Site of Special Scientific Interest (SSSI).

C.8.3 The current power station at Sizewell B is a Pressurized Water Reactor (PWR) which began generation in 1995 and is currently expected to operate until 2035.

Deployability by the end of 2025

C.8.4 The Strategic Siting Assessment (SSA) considered whether sites are credible for deployment by the end of 2025[221]. This is because it is important to focus on sites which can come on stream in good time to contribute to the Government's objectives on climate change and energy security.

C.8.5 At Sizewell, the Government notes in particular that detailed site investigation is ongoing. The Government notes that a grid connection agreement for a transmission capacity of 3300 MW is in place with National Grid. In December 2009 EDF and National Grid agreed a variation in the connection agreement in place for the site, amending the dates to 2020 for the first unit and 2021 for the second unit[222]. In October 2009, National Grid began a programme of public consultation on proposals for a new overhead line from Bramford near Ipswich to Twinstead near Sudbury. National Grid consulted on four route corridors and the new line is to support the connection of a number of new generators to the system in

221 For the purposes of this NPS, "deployment of new nuclear power stations" means commencing operation of one or more new nuclear power stations on the site.

222 This modified the previous agreement of connection dates of 2016 for the first unit and 2021 for the second unit, to align the connection dates with EDF's current programme requirements.

East Anglia and Suffolk, including a potential Sizewell C, two potential gas fired power stations and potential offshore wind farm development.

C.8.6 The Government is satisfied from the information provided by nominators and an independent assessment that, at the point of publication, Sizewell is credible for deployment by the end of 2025 regardless of whether it is deployed by that date.

Assessment of suitability against SSA criteria

C1: Demographics

Analysis

C.8.7 The Office for Nuclear Regulation has advised that the site does not exceed the semi-urban criterion. The furthest western edge of the boundary is adjacent to an area which exceeds the semi-urban criterion. The nomination says that land in the Goose and Kenton Hills is to provide for an access road and other facilities which may be located outside the nuclear power station boundary. It does not have sufficient defence-in-depth to house facilities which have potential to directly cause a radiological hazard.

C.8.8 Some responses were concerned over the effect that a new nuclear power station could have on limiting future development of housing in the Leiston area through restrictions in place on acceptable limits of population density around nuclear power stations. The Office for Nuclear Regulation has advised that the extent of the Emergency Planning Zone and the concomitant constraints on population growth in the nuclear safeguarding zones of the Sizewell site are determined principally by the radiological hazards that remain on the Sizewell A Magnox reactor site, which still holds spent fuel and radioactive waste.

Assessment

C.8.9 This site passes the demographics criterion.

Policy notes

C.8.10 See Section 3.6 of this NPS on flags for local consideration[223].

C.8.11 Given the proximity of the site boundary to an area which exceeds the semi-urban criterion, the applicant should demonstrate that it has taken the advice of the Office for Nuclear Regulation on demographic risk, and that subject to that advice, the Office for Nuclear Regulation is satisfied that the

[223] Flags for Local Consideration are siting criteria that were identified through the SSA consultation in 2008, but which (usually due to the need for detailed site-specific investigations and data) would be more appropriately assessed at the project level.

proposals do not result in a direct radiological hazard being sited in an area which exceeds the semi-urban criterion.

C2 and D5: Proximity to military activities

Analysis

C.8.12 The Ministry of Defence has advised that the site identified does not occupy any Ministry of Defence statutory safeguarding zones protecting aerodromes, explosive storage sites, technical sites or ranges. It is not within 1000 metres of any Ministry of Defence Danger Areas.

C.8.13 The Ministry of Defence has advised that no military firing activity occurs in the marine or landward areas adjoining the site. There are no military or explosive nuclear facilities within 1000 metres of the site. The Ministry of Defence has advised that it is reasonable to conclude, at a strategic level, that any likely power station development within the site boundary can be protected against the risk of external hazards created by neighbouring military activities throughout its lifetime[224]. The Office for Nuclear Regulation has agreed with this advice.

C.8.14 The Ministry of Defence has also advised that it is reasonable to conclude, at a strategic level, that any likely power station development within the site boundary will not adversely affect the capabilities of the armed forces to carry out essential training and operations throughout its lifetime.

Assessment

C.8.15 Based on the advice of the Office for Nuclear Regulation and the Ministry of Defence it is reasonable to conclude that:

- the site does not occupy any Ministry of Defence areas which would give rise to the site being excluded from assessment;
- the site is not in proximity to any Ministry of Defence assets or activities that would suggest that it should be ruled out;
- any likely power station development within the site boundary can be protected against the risk of external hazards created by neighbouring military activities throughout its lifetime; and
- it is potentially reasonable to conclude that the development of a new nuclear power station at the site would not affect the capabilities of the

224 See entry D2 in the table “The SSA criteria and how the sites were assessed” at the end of this Annex for details on the potential lifetime of the site and the period this assessment covers.

armed forces to carry out essential training and operations throughout its lifetime. Potential mitigating actions appear possible.

C.8.16 This site therefore passes these criteria.

Policy notes

C.8.17 See Section 5.4 of EN-1 on Civil and Military Aviation and Defence Interests.

D1: Flooding, storm surge and tsunami

Analysis

Flood zones

C.8.18 The site is in Flood Zones 1 and 3. Flood Zone 1 comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%). Flood Zone 3 comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year[225].

C.8.19 The Government believes that the fact that a site, or in this case, part of a site is in Flood Zone 3 should not necessarily preclude it from the NPS if the independent regulator has advised that the site can be potentially protected. At Sizewell the Environment Agency and the Office for Nuclear Regulation have advised that the site can potentially be protected from flood risk, including the effects of climate change, throughout its lifetime.

C.8.20 In addition to considering the availability of other sites in lower flood zones, the Government has taken a sequential approach which involves giving priority to areas at lower risk of flooding[226].

C.8.21 As well as submitting a flood risk assessment in accordance with Section 5.7 of EN-1, this NPS also sets out that the Infrastructure Planning Commission (IPC) will still need to be satisfied that a sequential approach has been applied at the site level to ensure that, where possible, critical infrastructure is located in the lowest flood risk areas within the site.

Sea level rise and the effects of climate change

C.8.22 Responses expressed concern regarding the potential impacts of climate change and the ability of the site to withstand these. There was particular concern regarding the length of time that waste may be on site. A report

225 See PPS25 for a full definition of the Flood Zones and what they cover: Planning Policy Statement 25: Development and Flood Risk, December 2006, Annex D, pp.22-25

226 See Section 3.7 of this NPS for details.

entitled *Climate Change - Adapting to the Inevitable?*[227] produced by the Institute of Mechanical Engineers was referred to. Responses stated that sea level rise may necessitate the abandonment of the site. The Appraisal of Sustainability[228] identified potential adverse effects relating to flood risk arising from predicted rising sea levels caused by climate change, especially during the later stages of operation and decommissioning of any new nuclear power station.

C.8.23 Waste will be stored in safe and secure interim storage facilities until a geological disposal facility becomes available. It is currently anticipated that disposal of new build wastes would begin once disposal of legacy wastes is completed. Geological disposal of higher activity waste from new nuclear power stations is currently expected to be available for new build waste from around 2130[229].

C.8.24 The Environment Agency has advised that it is reasonable to conclude that a nuclear power station within the site could potentially be protected against flood risks throughout its lifetime, including the potential effects of climate change, storm surge and tsunami, taking into account possible countermeasures. This assessment includes a consideration of sea level rise based on UKCP09 UK climate projections[230]. It is based on a consideration of the capacity of nominated sites to withstand flood risk and coastal erosion including the potential effects of climate change using modelling data that looks ahead to 2100. Predictions of potential climate change effects become increasingly less certain the further into the future that they extend. However, climate change projections will continue to be refined and, as time passes, will project further into the future. As such, should greater future impact be predicted, this should be identified well in

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227 Institution of Mechanical Engineers, Climate Change – Adapting to the Inevitable?, http://www.imeche.org/Libraries/Rita/IMechE_Adaptation_report.sflb.ashx

228 DECC, *Appraisal of Sustainability - site report for Sizewell*, October 2010, www.energynpsconsultation.decc.gov.uk

229 On the assumption that spent fuel will be stored on-site until it can be disposed of, the key factors in determining the duration of on-site storage are the availability of a geological disposal facility (GDF) and the time required for the spent fuel to cool sufficiently for disposal in a GDF. The Nuclear Decommissioning Authority (NDA's) current indicative timetable anticipates a GDF being available to take spent fuel from new nuclear power stations from around 2130, although the future optimisation of plans for the implementation of geological disposal and the expected inventory for disposal indications may provide potential to bring forward this date. Optimisation work will also explore options for reducing the cooling time required for spent fuel prior to disposal. The Government will expect operators to ensure their waste is disposable when a GDF is anticipated to be available to take the waste. See Section B.4 of this NPS for more detail. An indicative timeline for Geological Disposal can be found at http://www.decc.gov.uk/assets/decc/What%20we%20do/UK%20energy%20supply/Energy%20mix/Nuclear/geological-disposal-board/982-geological-disposal-timeline.pdf

230 http://ukclimateprojections.defra.gov.uk/

advance, giving time for appropriate actions to be taken to address those impacts.

C.8.25 The regulators have also examined the adaptability of the sites to potential changes in flood hazard and are satisfied that additional safeguards are in place to ensure that only suitable sites achieve development and ongoing operational consent. This will also be reviewed in more detail as part of the planning and licensing stage and as part of the Flood Risk Assessment that applicants must undertake in conjunction with their applications to the IPC.

C.8.26 Should sites achieve development consent, their capacity to withstand potential climate change will remain under consideration throughout the life of the nuclear power station. Once licensed, as part of the site licensing conditions, the licensee must review their safety case at regular intervals (typically on a ten yearly basis). This review will take the most recent climate change projections into account and allow the necessary modifications to flood defences and/or operating arrangements to be undertaken. The objective of the review is to compare the safety case of the site against modern standards to see if there are reasonably practicable improvements that could be made, to ensure that the plant is safe to continue to operate, including spent fuel and radioactive waste storage for the next defined period.

C.8.27 The Environment Agency has also noted that sea level rise and land raising of the development will need to be taken into account when considering flood storage loss due to the development, because mitigation of flood risk to the site could have an adverse impact on flood risk in the surrounding area by reducing the capability of area to absorb and disperse flood water. The Environment Agency has noted that at this strategic stage it is not possible to assess the impact on flood risk in the surrounding area from development and that this will need to be considered as part of the flood risk assessment submitted to the IPC as part of the application for development consent.

C.8.28 The report *Climate Change - Adapting to the Inevitable* indicates that a projected 2m sea level rise in the second half of the 23rd century would have a major impact on the UK if no adaptation effort is made to prevent it, including inundating the Norfolk Broads and major parts of London such that the viability of London, key ports and the Sizewell site would be threatened. The Environment Agency has considered this report and note that the latter half of the 23rd century is significantly beyond the expected timescale for the complete decommissioning of the Sizewell site. The Environment Agency has advised that they agree with the report's suggestion that the site might need additional flood protection in the future, as reflected above.

Fluvial flooding

C.8.29 A number of responses also highlighted the risk of fluvial flooding and its impact on sea defences, with particular reference to an instance where there is high fluvial run off combined with a tidal surge and the impacts that this may have on the potential development. There was concern that the site is partially within Flood Zone 3.

C.8.30 The Environment Agency has also noted that there is a fluvial risk to part of the site not covered in the nomination. This is from drainage channels connected to Minsmere Sluice, and this fluvial risk does not affect the Environment Agency overall conclusion. It has also noted that flooding could impede access and egress, however, this could be mitigated for in the design of such routes to ensure the access remains open. The routes will need to be designed to ensure they do not increase the flooding risk impact elsewhere.

Assessment

C.8.31 This site passes this criterion. This takes into account in particular the advice of the Environment Agency that it is potentially reasonable to conclude that any new nuclear power station on the site could potentially be protected against flood risk throughout its lifetime, including the potential effects of climate change, storm surge and tsunami and considering possible countermeasures. The impacts of possible countermeasures will need to be considered should an application come forward.

Policy notes

C.8.32 See Section 5.7 of EN-1 and Section 3.7 of this NPS on flood risk.

D2: Coastal processes

Analysis

C.8.33 The Environment Agency has advised that development at the site could avoid or mitigate the effects of coastal erosion or other landscape change scenarios throughout its lifetime, including the potential effects of climate change. The Environment Agency has advised that, based on the current understanding of coastal erosion in this area there is no technical reason that would prevent the site being protected/mitigated from the effects of coastal erosion, although there are potential difficulties.

C.8.34 Responses commented that the coastline in this general area is extremely vulnerable and is eroding at an ‘accelerated rate’. The Environment Agency has noted that whilst erosion in front of the existing Sizewell station has not yet become a significant issue, in the last few years there have been signs that the shoreline adjacent to the site has come under a greater degree of stress. This advice refers to natural processes affecting the adjacent

coastline and not the site itself. The Environment Agency does not consider that the shoreline has come under greater stress in recent years. It advises that there have been storms that have removed material from the local beaches but these events are part of natural processes and the material will be replenished. The Environment Agency considers that there is no accelerated rate of erosion and that its conclusion that the site could avoid or mitigate the effects of coastal erosion remains sound. There are interrelationships between areas along this stretch of coastline. The Environment Agency considers that the effects of this erosion and potential outflanking need to be assessed along with the development of the near shore banks (Dunwich and Sizewell) as these banks are believed to be changing in form in a way which is adding to the erosion pressure north of the site, and as these banks mitigate the severity of change to the inner shore during major storms. Responses were also received regarding the role played by Minsmere Sluice. The Environment Agency has advised that it recognizes the importance of the Minsmere Sluice to the protection of the coastline from erosion, and is in discussions with the local stakeholder group. The Environment Agency has advised that future shoreline developments to the north of the site must also be considered in relation to Minsmere Sluice outfall and the effect that it has on the current position of the shore. The expected life of this existing structure is around 20 years. If the outfall pipe were no longer present this could potentially increase erosion towards the power station site.

C.8.35 The Environment Agency has also advised that there is a lack of sizeable quantities of sediment moving along the shoreline, so the future impacts on the current banks needs to be assessed with a plan necessary to undertake more substantial coastal defences should the need arise. Some responses were concerned about the impacts that potential new sea defences for a new power station may have along the coast to the north and south of the site including the coastline that fronts the Minsmere Levels to the north, and the surrounding AONB. It was raised that erosion may not just be caused by coastal defences but could be caused by other construction related to the power station. There were concerns about the impact of coastal defences on the surrounding area.

C.8.36 The Appraisal of Sustainability has noted that there are existing sand and shingle flood defences in place which may require upgrading to protect the site for the full life time of a new power station. It considers that new coastal defences may have potential effects on erosion and visual appearance of the coastline, identifying possible impacts on coastal processes, hydrodynamics and sediment transport from any necessary or upgraded coastal defences.

C.8.37 The Environment Agency has advised that the positioning of the site is important and that the applicant should consider the long term effects of coastal erosion which need to be understood before fixing on a specific location.

C.8.38 A reference was made to the work of the Marinet Group of Friends of the Earth[231] on marine aggregate dredging and whether there were effects from offshore dredging which would render the site unsuitable and have wider effects on the coastline. The Environment Agency has advised that to obtain a dredging licence a Dredging Permission must be obtained from the Government, a procedure which includes the submission of an Environmental Impact Assessment and studies to ascertain whether there is any possibility of negative impacts upon the coastline. The Environment Agency are aware of the dredging in an area (area 430) which is located 15 miles off shore of Southwold. Previous studies show that there is no evidence that aggregate dredging could have an impact upon the shoreline, the Environment Agency would expect any developer of the Sizewell site to consider the dredging activity in their assessment of coastline behaviour when applying for a Development Consent Order. However, given that there is no evidence of an impact on the shoreline from aggregate dredging, the Environment Agency has advised that it is possible this could be scoped out at an early stage.

Assessment

C.8.39 Based on the advice above it is reasonable to conclude that a nuclear power station at the site could be protected against coastal erosion, including the effects of climate change, for the lifetime of the site. Mitigation of the effects of coastal processes may be possible through appropriate design and construction of defences or the positioning of elements of the infrastructure on the site. Whilst the current inundation and erosion threat at Sizewell is relatively low this does not understate the complex potential nature of coastal processes around this site. The Environment Agency has underlined the importance of understanding the long term trends which are occurring regarding erosion at this site. This will need to include an assessment of the effects on the surrounding area.

Policy notes

C.8.40 See the relevant guidance in EN-1 including Section 5.5 on coastal change, and the relevant guidance in Part 3 of this NPS including that on coastal change and on flood risk. EN-1 sets out that where relevant, applicants should undertake coastal geomorphological and sediment transfer modelling to predict and understand impacts and help identify relevant mitigating or compensatory measures. The Government considers that this would be relevant at this site.

C.8.41 The applicant's proposals should reflect consideration of the issues outlined above, including how the site would be protected should the Minsmere Sluice outfall pipe no longer be present; the effects on

231 http://www.marinet.org.uk/

surrounding areas which may be more susceptible; and, a consideration of the impact of siting outfalls and other associated infrastructure.

D3: Proximity to hazardous industrial facilities and operations

Analysis

C.8.42 Based on Health and Safety Executive records the site is not in the vicinity of any COMAH[232] establishments. The Office for Nuclear Regulation has advised that as with all sites during licensing the licence applicant to the Office for Nuclear Regulation will also need to take account of the need for countermeasures to protect nuclear operations from any hazards and risks from any nearby notified major hazard pipelines, based on information from the relevant pipeline operators about their routes and fluids being conveyed.

Assessment

C.8.43 This site passes this criterion. Given the proximity to hazardous facilities it is reasonable to conclude that any likely power station development within the nominated boundary can be protected against risk arising from proximity to hazardous facilities throughout its lifetime, taking into account possible counter-measures.

C.8.44 As part of their assessment of a proposed power station regulators consider the developer's estimation of the threats posed to the site by nearby hazardous facilities and any proposed mitigating action.

Policy notes

C.8.45 See Section 4.12 of EN-1. The applicant should demonstrate that it has consulted the Local Planning Authority where appropriate.

D4: Proximity to civil aircraft movements

Analysis

C.8.46 The Civil Aviation Authority has advised that it is potentially reasonable to conclude that any likely power station development within the site boundary can be protected against risks from civil aircraft movement.

C.8.47 Nuclear power stations in the UK receive some protection from aviation activity through the establishment of a Restricted Area at each individual station. This is established by legislation[233]. Typically, such Restricted

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232 Under the Planning (Control of Major Accident Hazards) Regulations 1999. See http://www.hse.gov.uk/comah/background/comah99.htm# for more information.

233 In accordance with Statutory Instrument 2007 No 1929 (The Air Navigation (Restriction of Flying) (Nuclear Installations) Regulations 2007).

Areas have a radius of 2 nautical miles and extend vertically to 2000 feet above the surface. Any aviation activity within a Restricted Area is limited to that specifically permitted by the legislation.

C.8.48 The Civil Aviation Authority has advised that the existing Sizewell nuclear installation has an associated Restricted Area and that a Restricted Area around the site (or an amendment to the existing Restricted Area) could provide a similar level of protection from civil aircraft movements. The current Statutory Instrument allows for helicopter activity associated with the nuclear installation. Any amended Statutory Instrument will need to consider such activity.

C.8.49 The Civil Aviation Authority has also advised that it is potentially reasonable to conclude that neighbouring aerodromes and air traffic control areas can mitigate any effects arising from the Restricted Area around the nominated nuclear power site. In reaching this conclusion it has noted that it is not anticipated that any new or amended Restricted Area established in association with the proposed nuclear installation would impact upon local aerodrome operations; that there are no known (i.e. marked on Civil Aviation Authority approved charts or promulgated in the UK Aeronautical Information Publication) civilian landing sites in such proximity to the proposed nuclear installation that a new or amended Restricted Area would have a material impact on associated operations; and that the current establishment of the existing Sizewell Restricted Area is such that the impact of a new or amended Restricted Area (as described above) upon civil aircraft in transit through local airspace is likely to be negligible.

Assessment

C.8.50 Given the advice above it is reasonable to conclude that any likely power station development within the site boundary can be protected against risks from civil aircraft movement, and that the effects on air traffic and aerodromes can be potentially mitigated.

Policy notes

C.8.51 See the relevant guidance in EN-1, including that on civil and military aviation and defence interests. See the relevant guidance in Part 3 of this NPS, including that on proximity to aircraft movements.

For D5 see C2

D6: Internationally designated sites of ecological importance[234]

Analysis

C.8.52 A number of responses expressed concern over the impacts that a new nuclear power station may have on European protected sites which are situated near the site. These concerns include impacts on protected bird populations (including nightjar, woodlark and little tern), water quality, fish and shellfish populations and the effects of cooling water abstraction and discharge. There was a particular concern that the recently designated Outer Thames Estuary Special Protection Area (SPA) should be considered as part of the assessment.

C.8.53 The Appraisal of Sustainability[235] has identified the potential for adverse effects on sites and species considered to be of European nature conservation importance. This means that significant strategic effects on the biodiversity cannot be ruled out at this stage of the appraisal. The findings of the Appraisal of Sustainability on European Sites are drawn from the Habitats Regulations Assessment for Sizewell. The Habitats Regulations Assessment notes that its key findings are limited by the strategic nature of the assessment process and the information available, which does not generally allow for a definitive prediction of effects on the European Sites considered. A precautionary approach suggests that the assessment at this strategic level cannot rule out the potential for adverse effects on the integrity of nine European Sites (Alde-Ore and Butley Estuaries Special Area of Conservation (SAC), Alde-Ore Estuary SPA / Ramsar, Minsmere to Walberswick Heaths and Marshes SAC, Minsmere to Walberswick SPA/ Ramsar, Orfordness-Shingle Street SAC, Sandlings SPA, Outer Thames Estuary SPA) through potential impacts on water resources and quality, habitat and species loss and fragmentation, and disturbance (noise, light and visual). For example, the assessment has identified that development could result in habitat loss which could affect breeding populations of woodlark and nightjar in Sandlings SPA or cause disturbance to little terns in the Minsmere to Walberswicke SPA and Ramsar.

C.8.54 The Habitats Regulations Assessment on sites of international importance has proposed a suite of avoidance and mitigation measures to be considered as part of the project level Habitats Regulations Assessment. At this stage, it is assessed that the effective implementation of the proposed

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234 These are occasionally referred to as “European Sites”, “European designated sites”, or “sites of European importance”. See entry D6 in the table “The SSA criteria and how the sites were assessed” at the end of this annex for details of these designations and what they cover.

235 See footnote 228

suite of avoidance and mitigation measures may help to address adverse effects on European Site integrity, but that more detailed project level Habitats Regulations Assessment is required to reach conclusions that are in accordance with the requirements of the Habitats Directive.

C.8.55 The Outer Thames Estuary SPA is considered in the Habitats Regulations Assessment. The assessment concludes that adverse effects on water resource and quality, habitat loss and fragmentation, and disturbance (noise, light and visual) cannot be ruled out until further site specific detail including on technology and mitigation measures, and processes such as the extent and location of coastal defences, dredging, or marine offloading facilities) are known. Air Quality impacts on the Outer Thames Estuary SPA were screened into the appropriate assessment due to the close proximity of the SPA to Sizewell. However, after further consideration, adverse effects on site integrity have been ruled out. It is considered unlikely that any localised changes to air quality will reach a level that results in impacts on the integrity of the SPA.

Assessment

C.8.56 The Government notes the scope for avoidance and mitigation identified in the Habitats Regulations Assessment, and the need for more detailed studies should an application for development consent come forward. Given that the Habitats Regulations Assessment has not been able to rule out adverse impacts on sites of European nature conservation importance, the Government has carefully considered whether it is appropriate to include this site in the NPS.

C.8.57 Annex A of this NPS sets out that the Government has concluded that there is an Imperative Reason of Overriding Public Interest that favours the inclusion of this site in the Nuclear NPS despite the inability to rule out adverse effects on European Sites at this stage. This takes into account the need for sites to be available for potential deployment by the end of 2025, the lack of alternatives, and the consideration given to compensatory measures.

Policy notes

C.8.58 See the relevant guidance in EN-1, including that on the Environmental Statement, Habitats Regulations Assessment and biodiversity and geological conservation. See the relevant guidance in Part 3 of this NPS, including that on biodiversity and geological conservation.

C.8.59 The IPC should also refer to the Appraisal of Sustainability and Habitats Regulations Assessment for Sizewell and consider whether the applicant's proposals have sufficiently taken into account the issues identified, where they are still relevant.

D7: Nationally designated sites of ecological importance

Analysis

C.8.60 Some responses focused on designated sites including Sizewell Marshes Site of Special Scientific Interest (SSSI) and Leiston-Aldeburgh SSSI, and potential effects on Minsmere-Walberswick Heaths and Marshes SSSI, from which the site boundary includes some land-take. Some responses questioned how direct land take could be mitigated. Responses were particularly concerned that an access road which is reflected in the site boundary could result in the loss of woodland and heathland habitat at Kenton Hills, Goose Hills and Sizewell Belts. Some responses noted that planning permission had been refused in this area in the past.

C.8.61 The Appraisal of Sustainability identified the potential for adverse effects on sites and species considered to be of national nature conservation importance means that significant strategic effects on biodiversity cannot be ruled out at this stage of the appraisal. The Appraisal of Sustainability identifies that there could be potential significant effects at the following SSSIs which are within 5km of the site: Sizewell Marshes SSSI; Minsmere-Walberswick Heaths and Marshes SSSI; Leiston-Aldeburgh SSSI; Alde-Ore Estuary SSSI. The Appraisal of Sustainability also notes that the above designated sites include RSPB reserves adjacent to the site (Minsmere) and within 1.5km to the north (North Warren).

C.8.62 As the site boundary also indicates land-take from Sizewell Marshes SSSI, the Appraisal of Sustainability finds that construction and the presence of development are likely to lead to direct loss and fragmentation of habitats within the Sizewell Marshes SSSI. Sizewell Marshes SSSI is an area of grazing marsh with important assemblages of invertebrates and breeding and winter bird populations.

C.8.63 The Appraisal of Sustainability identified the potential for the mitigation of biodiversity effects on sites of UK wide conservation importance (Sizewell Marshes SSSI), including the creation of replacement habitat. The Appraisal of Sustainability notes that developers could avoid or minimise losses and disturbance to protected species through careful site layout, design, routing, location of the development, associated infrastructure, and construction management and timings. The Appraisal of Sustainability finds that there is potential for habitat creation within the wider area in order to replace lost ‘wet meadows’ habitats of the Sizewell Marshes SSSI, but also finds that it may not be possible to fully compensate for losses of this habitat. The applicant will need to develop an ecological mitigation and management plan to minimise the impacts.

Assessment

C.8.64 The Government notes that the Appraisal of Sustainability has identified potential impacts on nationally designated sites of ecological importance

which it considers of strategic significance. Given the scope for mitigation of biodiversity effects identified in the Appraisal of Sustainability for sites of national importance it is reasonable to conclude that it may be possible to avoid or mitigate impacts to an extent. However, the Appraisal of Sustainability has highlighted that the site includes land take from Sizewell Marshes SSSI that could lead to direct impacts.

C.8.65 The Government has carefully considered whether this site meets this criterion given the direct impact on Sizewell Marshes SSSI. However, given the need to ensure sufficient sites are available for development to meet the Government's energy policy objectives (as described in Part 2 of this NPS), the Government believes that it does. In view of the need for sites and the limited number of potentially suitable sites, the Government does not think the issues in relation to this criterion are sufficient to justify not including the site in this NPS. The Government has also noted that there will be further assessment of any proposal for the site at project level and that EN-1 sets out detailed consideration that must be given to issues related to nationally designated sites, should an application for development consent come forward.

Policy notes

C.8.66 See the relevant guidance in EN-1, including that on the Environmental Statement and biodiversity and geological conservation. See the relevant guidance in Part 3 of this NPS, including that on biodiversity and geological conservation.

C.8.67 The IPC should also refer to the Appraisal of Sustainability for Sizewell and consider whether the applicant's proposals have sufficiently taken into account the issues identified, where they are still relevant.

D8: Areas of amenity, cultural heritage and landscape value

Analysis

C.8.68 The site is entirely within the Suffolk Coast and Heaths AONB. Responses raised concerns about the adverse effects on the AONB particularly in regard to the impact development of an access road to the site could have on the Kenton and Goose Hills and the AONB. In particular responses were concerned that an access road could run through the whole of the AONB and were concerned about the visual impact that this would have on the character of the area.

C.8.69 The SSA has not assessed in detail proposals for associated works such as access roads. Such details could change without affecting the overall strategic suitability of the site. The Government believes that this type of proposal is more appropriately considered by the IPC. There is no presumption that development will take place in the area of the access road. The IPC will need to consider detailed plans using the guidance

provided within EN-1 and EN-6, and the IPC should in particular seek evidence that the applicant has consulted the local authority and the AONB on any proposals for a road. The Government recognises that, as with all sites, detailed consideration of the proposals at the local level could result in changes to the nominated boundary area.

C.8.70 With regard to the visual impact of the development, the nominator has proposed that this could be mitigated, in part, by locating the principal structures along the same visual axis of the existing stations. The nominator has also noted that there is established plantation woodland to the north-west of the site and it would be the intention to retain some of this woodland to help screen the development. The nominator has also proposed that mitigation is also likely to be achieved by minimising ancillary land use in those areas away from the main power station site, although this would depend on consultation with local planning authorities.

C.8.71 Finally, the nominator of the site has noted that there is some potential for landscape and nature conservation benefits through the creation of habitats such as heath land on land surrounding the site, which it believes could help offset the impacts of additional development in the AONB and provide landscape continuity with those heath land areas adjoining the Sizewell Estate to the north and south[236].

C.8.72 The Appraisal of Sustainability has noted that the existing power station structures are already prominent features within the AONB from local viewpoints and are visible from some longer-distance viewpoints, including from higher ground inland and from Southwold on the coast to the north. Whilst the new power station will be seen within the context of the existing power stations, before their decommissioning, given the likely scale of the development, there are likely to be some long lasting adverse direct and indirect effects on landscape character and visual impacts on the AONB.

C.8.73 The Appraisal of Sustainability considers that some impacts could be potentially mitigated for over time, for example by new planting and potentially through compensatory planting in the surrounding area. The decommissioning of the facilities may allow some landscape restoration of previously developed areas in the long term, however, the Appraisal of Sustainability notes that long term land uses for the restored areas are difficult to predict at this stage. Therefore the Appraisal of Sustainability has found that there is the potential for some long lasting adverse direct and indirect effects on landscape character and visual impacts on the Suffolk Coast and Heaths AONB, with limited potential for mitigation.

C.8.74 The impact of transmission infrastructure on the local area was raised by responses as a potential issue and the Appraisal of Sustainability notes

236 See www.energynpsconsultation.decc.gov.uk for the nomination documents for Sizewell, and in particular the nomination report.

that in-combination adverse effects on landscape are likely to arise from new raised roadways and access connections to the rail head and potentially new associated transmission lines/grid connectivity. Applications for development consent for nationally significant grid infrastructure will be considered by the IPC within the framework of the Electricity Networks NPS (EN-5). Applicants are required to consult local communities about their plans before submitting them to the IPC[237].

C.8.75 There were also concerns about the visual impact that flood defences could have. The effect would depend greatly on the type and location of flood defences that were proposed.

C.8.76 The Appraisal of Sustainability has also identified potential for adverse impacts on the setting of Scheduled Monuments, Conservation Areas and Listed Buildings in the area. These impacts could arise depending on the distance and sight lines from any potential new nuclear power station, and the mitigation that may be applied. The Appraisal of Sustainability identifies cultural heritage features in the area including the nearest scheduled monument of the original site of Leiston Abbey with a later chapel and pillbox which lies within approximately 2km of the site and the nearest Conservation Areas of Leiston and Thorpeness which are located within an approximate 3km distance of the site. There are no listed buildings within or directly adjacent to the site. However, the Appraisal of Sustainability identifies that there are around 90 Grade II listed buildings within an approximate 5km distance and there may be an effect on their settings[238].

C.8.77 The Appraisal of Sustainability also notes that there is also potential for adverse physical impacts upon significant buried archaeology (Prehistoric, Roman and Medieval activity is evident from an earlier investigation within the existing nuclear power station site boundary indicating that an unknown archaeological buried resource is potentially present). However, the Appraisal of Sustainability finds that these impacts may be mitigated to some degree by appropriate facility location.

C.8.78 Some responses were concerned about coastal access and whether access to the heritage coastal path may be lost, and the effect this would have on the local tourist industry, particularly during the construction of the new nuclear power station. Section 5.10 of EN-1 (Land Use including open space, green infrastructure and green belt) sets out that rights of way, National Trails and areas of access to land (e.g. open access land) are important recreational facilities and that mitigation measures should be

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237 Government notes that National Grid has announced that it will be carrying out consultation on route options for network reinforcements in South Suffolk and Essex, starting in October 2009.

238 Grade I buildings are of exceptional interest, sometimes considered to be internationally important. Grade II* buildings are particularly important buildings of more than special interest. Grade II buildings are nationally important and of special interest. See http://www.english-heritage.org.uk

considered by the applicant or the IPC as necessary. It also sets out the importance for consideration of coastal recreation and access to the coast. The IPC will consider the implications for development of the creation of a continuous signed and managed route around the coast, as set out in the Marine and Coastal Access Act 2009, using the guidance in EN-1. Possible mitigation measures might include siting certain elements of a station away from public footpaths and/or the provision of realignments to existing or planned rights of way.

C.8.79 The Government notes that there are tourism industries in the surrounding area of some existing nuclear facilities. However, it is not possible at this stage to accurately assess whether a new nuclear power station would impact on tourism in the area bearing in mind that this is a strategic assessment being conducted at an early point in the planning process. The IPC are better placed to consider this at the point at which detailed proposals come forward. Section 5.12 of EN-1 sets out that the IPC should consider socio-economic effects including those on tourism.

Assessment

C.8.80 In assessing this site the Government has considered the purpose of the AONB, which is of conserving and enhancing the natural beauty of the area of outstanding natural beauty.

C.8.81 The Appraisal of Sustainability identified that there is the potential for some long lasting adverse direct and indirect effects on landscape character and visual impacts on the Suffolk Coast and Heaths AONB, with limited potential for mitigation given that the site is wholly within the AONB.

C.8.82 This could have an effect on the purpose of the designation. To further understand these effects and the effectiveness of the mitigating actions proposed by the nominator of the site, further detailed assessment at project level is required – the Appraisal of Sustainability suggests through the provision an integrated landscape, heritage and architectural plan. The potential for remaining effects can best be fully assessed when detailed plans come forward because they depend on a range of factors including the detailed proposals for minimisation and mitigation, the cooling technology proposed and location of transmission infrastructure. However, given the limited scope for mitigation, a level of impact is likely to remain.

C.8.83 The Government recognises that whilst there is some potential for partial minimisation and mitigation of the effects, there could be remaining effects on the AONB. However, as explained in Part 2 of this NPS, there is a need to ensure sufficient sites are available for development to meet the Government's energy policy objectives. In view of this and in view of the limited number of potentially suitable sites, the Government does not think the issues in relation to this criterion are sufficient to justify (against this criterion) not including the site in this NPS. The Government has also noted

the fact that there will be further detailed assessment of any proposal for the site should any application for development consent come forward.

C.8.84 The Government also notes that there may be some visual impacts on the setting of other cultural heritage features in the area. Impact and mitigation measures will need to be considered by the IPC, but at this stage the potential effects are not felt sufficient to outweigh the need for sites as set out in Part 2 of this NPS, particularly given the need for further investigation and the scope for some mitigation that has been identified.

Policy notes

C.8.85 See the relevant guidance in EN-1 and Part 3 of this NPS, including that on landscape and visual impacts. The IPC should also refer to the Appraisal of Sustainability and the applicant's proposals for Sizewell and consider whether the applicant's proposals sufficiently avoid or mitigate potential impacts where they are still relevant.

C.8.86 It should also be noted that whilst the Appraisal of Sustainability has noted the potential strategic environmental and sustainability implications of transmission infrastructure, detailed environmental assessment should be made by the applicant at the IPC stage, and this would be considered in conjunction with EN-5 which is the Electricity Networks NPS.

C.8.87 See Section 5.10 of EN-1 on Land Use including open space, green infrastructure and green belt for information on rights of way and coastal access.

D9: Size of site to accommodate operation

Analysis

C.8.88 The nominated area is approximately 117 hectares. Based on the advice of the Office for Nuclear Regulation there is sufficient area within the nominated boundary to house and provide sufficient defence-in-depth for essential infrastructure. However, the areas to the south of the existing Sizewell A and B Stations and to the west of longitude grid reference 64702 do not provide sufficient space for effective defence-in-depth for a nuclear reactor, including the associated turbine hall, spent fuel and intermediate level waste stores. Similarly, siting such activities into the land north of latitude grid reference 26453 could present security challenges because of the narrowing width of the nominated land. These parts of the site could still be used for locating supporting infrastructure that has no potential to directly cause a radiological hazard.

C.8.89 The size of the site and the potential impact this could have on the AONB remained of concern in some responses. To reduce the likelihood of further land being needed, and increase the usability of their site, nominators were encouraged to ensure that the area nominated included within it all likely

actual site plans and all reasonable variations to those plans. It is therefore possible that the nominated area is in fact larger than the actual site plan that will be put forward, in due course, for development consent. Nominators have indicated that in their view the size of site required for the operation of a permanent site of a single nuclear power unit allowing for operation, maintenance, storage of spent fuel and intermediate level waste would be between 30 to 50 hectares. The Office for Nuclear Regulation concur with this estimate. In addition, considerations of the space needed to provide for security defence-in-depth show that there should be enough land available at this site.

Assessment

C.8.90 Although the Office for Nuclear Regulation has identified areas of the site which may not provide sufficient defence-in-depth for a nuclear reactor, based on the advice of the Office for Nuclear Regulation it is reasonable to conclude that there is enough land within the boundary nominated to safely and securely operate at least one single unit nuclear power station, including the safe and secure storage of all the spent fuel and intermediate level waste produced through operation, and from decommissioning, on the site of the station until it can be sent for disposal in a geological disposal facility.

Policy notes

C.8.91 The safety and security of a nuclear power station is considered by the Office for Nuclear Regulation as part of the licensing regime. See Part 3 of this NPS for guidance on the relationship between the regulatory framework and the planning regime.

C.8.92 See Section 5.10 of EN-1 on Land Use including open space, green infrastructure and green belt for information on rights of way and coastal access.

D10: Access to suitable sources of cooling

Analysis

C.8.93 The nominator details a range of potential cooling technologies but expresses a preference for direct cooling from the sea. The Environment Agency has advised that it is reasonable to conclude that there is access to potentially suitable sources of cooling at the site[239].

C.8.94 The Environment Agency has also advised that there are important local marine nursery grounds for mackerel, herring, sprat and plaice. There are populations of migratory trout on this coast, and there are local populations

239 See footnote 236

of twaite shad. The Appraisal of Sustainability notes that a potentially significant effect could occur as a result of the return of cooling water to the sea at elevated temperatures. This could result in adverse impacts on both sediment transport and water quality. It has identified potential indirect effects on nationally and internationally designated habitats, including from the thermal impact of cooling water discharges although it notes that any potential impacts would be assessed during detailed design and considered in any application for a consent to make discharges. The Environment Agency has also advised that any potential impacts would be assessed during detailed design and considered in any application for a consent to make discharges. This would require the discharges to meet regulatory standards for the protection of the quality of estuarine or coastal waters in line with future requirements of the Water Framework Directive[240].

C.8.95 Responses were concerned about damage to fish populations caused by the intake of larger volumes of water for any new station in combination with Sizewell B. However, there are forms of mitigation available to protect marine ecology from the effects of cooling technology. The Environment Agency's report on cooling[241] outlines these forms of mitigation. These include location and design of intake structures and screens and the use of fish deterrent and fish recovery return systems.

Assessment

C.8.96 Based on the findings of the Appraisal of Sustainability and the Environment Agency it is reasonable to conclude that there is access to suitable sources of cooling at the site. The site passes this criterion. Detailed modelling as part of the licensing process will give greater clarity about the acceptability of impacts in the light of the cooling technology that is proposed.

Policy notes

C.8.97 See the relevant guidance in EN-1, including Section 5.3 on biodiversity and Section 5.5 on coastal change, given that a new development may require offshore infrastructure for intake and outfall.

C.8.98 See the relevant guidance in Part 3 of this NPS, including that on water quality and resources.

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240 The Water Framework Directive: European Directive 2000/60/EC establishing a framework for Community action in the field of water policy

241 Environment Agency, *Cooling Water Options for the New Generation of Nuclear Power Stations in the UK,* 2010, http://publications.environment-agency.gov.uk/epages/eapublications.storefront/4d95b71100342058273fc0a802960654/Product/View/SCHO0610BSOT&2DE&2DE

C.8.99 See Part 3 of this NPS for guidance on the relationship between the regulatory framework and the planning regime.

Appraisal of Sustainability and Habitats Regulations Assessment for Sizewell

C.8.100 The Planning Act 2008[242] requires an Appraisal of Sustainability to be carried out for all NPSs. The purpose of an Appraisal of Sustainability is to consider the social, economic and environmental impacts of the policy and to suggest possibilities for improving the sustainability of the NPS. The purpose of the Appraisal of Sustainability for Sizewell is to examine the potential positive and negative effects of the site, identify the significance of these effects, and suggest any mitigation possibilities.

C.8.101 This NPS has also been assessed in accordance with the European Habitats Directive. That assessment (the "Habitats Regulations Assessment") tests whether a plan or project could have an adverse effect on the integrity of European Sites of nature conservation importance. A Habitats Regulations Assessment was carried out on the Sizewell site.

C.8.102 The key findings of the Sizewell Appraisal of Sustainability and Habitats Regulations Assessment highlight areas of significance on, amongst other things:

i) the site lies on the Suffolk Heritage Coast and is wholly within the Suffolk Coast and Heaths AONB;

ii) potential adverse effects on a number of nature conservation sites of UK and European importance including Minsmere-Walberswick Heaths and Marshes SSSI and SAC, Minsmere-Walberswick SPA and Ramsar, Sizewell Marshes SSSI, Leiston-Aldeburgh SSSI, Sandlings SPA, Alde-Ore Estuary SSSI,SPA and Ramsar, Alde-Ore and Butley Estuaries SAC and Outer Thames Estuary SPA;

iii) effects on water quality and fish/shellfish populations in nearby coastal waters due to the abstraction and release of sea water for cooling;

iv) there are existing sand and shingle flood defences in place, which the Appraisal of Sustainability considers may require upgrading to protect the site for the full life time of a new power station, which may have potential effects on erosion and visual appearance of the coastline. The Appraisal of Sustainability finds these effects significant, but mitigation opportunities may be available following further study; and

v) The Appraisal of Sustainability has found that Sizewell is not close to any other site and therefore does not form part of a cluster. This

242 Planning Act 2008

means that regional cumulative effects are not considered relevant for this site. However, the potential for adverse effects from Bradwell and Sizewell on the European designated site of the Outer Thames Estuary indicates that there may be interactions and cumulative effects on biodiversity should both sites be developed. Guidance on the consideration of cumulative effects is in EN-1. For instance Section 4.2 says that "the IPC should consider how the accumulation of effects might affect the environment, economy or community as a whole, even though they may be acceptable when considered on an individual basis with mitigation measures in place".

C.8.103 The outputs of the Appraisal of Sustainability and Habitats Regulations Assessment on these key findings are discussed against the SSA criteria above. On key finding v), interactions between potential developments can be complex and will depend on what relevant proposals have come forward. This can only be properly assessed at the point at which an application for development consent is made.

C.8.104 Paragraph 4.2.1. of EN-1 sets out that when considering cumulative effects, the Environmental Statement that accompanies an application 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 or granted, as well as those already in existence) [243].

Other issues raised during the assessment

C.8.105 This section deals with other common issues at this site that were raised in responses

Health

C.8.106 The Appraisal of Sustainability for Sizewell has considered strategic effects on human health and well being. The Appraisal of Sustainability looks at a range of different factors and should be referred to for a more in depth assessment.

C.8.107 The Appraisal of Sustainability has found that the rigorous system of regulation of routine discharges from any new nuclear power station at Sizewell should ensure that there are no unacceptable risks to the health of the local population under normal operating conditions.

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243 For guidance on the assessment of cumulative effects, see, for example, Circular 02/99, *Environmental impact assessment*; or *Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions*: http://ec.europa.eu/environment/eia/eia-studies-and-reports/guidel.pdf.

C.8.108 The Appraisal of Sustainability also concludes that there is a very small risk of adverse health impacts arising from an accidental release of radiation but the multiple safety features within modern nuclear plants makes such an event exceedingly unlikely. Section 3.13 of this NPS (Human health and wellbeing) sets out that the risk of an accident resulting in exposure to radiation for workers, the public and the environment is very small because of the UK's strict regulatory regime. Section 3.13 should be referred to for further guidance.

C.8.109 It is possible that the presence of a nuclear power station may lead to increased stress levels in certain individuals. Overall, the Appraisal of Sustainability finds that likely enhancement in employment, community wealth, housing stock and other associated neighbourhood infrastructure should improve community well-being and health generally.

C.8.110 Responses were particularly concerned about whether there were links between nuclear power stations and cancer. This has been the subject of the work of the Committee on Medical Aspects of Radiation in the Environment (COMARE)[244]. Its view is that there is no evidence for unusual aggregations of childhood cancers in populations living near nuclear power stations in the UK.

C.8.111 COMARE's tenth report considered the incidence of childhood cancer around nuclear installations. These were divided into nuclear power generating stations and other nuclear installations. The results for the power generating stations supported the conclusion that 'there is no evidence from this very large study that living within 25km of a nuclear generating site in Britain is associated with an increased risk of childhood cancer'.

C.8.112 In its eleventh report COMARE examined the general pattern of childhood leukaemia within Great Britain and concluded that 'the search for increased risk levels near to nuclear power generation sites shows no pattern of excess cases of childhood cancer close to the sites of these types of nuclear installations' Among its recommendations, the report said that the incidence of childhood leukaemia and other cancers in the vicinity of Sellafield and Dounreay, which are not power generating stations, was raised and should be kept under surveillance and periodic review.

C.8.113 Responses raised particular concerns about the findings of the KiKK study[245] undertaken in Germany. Following the publication of the KiKK

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244 COMARE is an independent scientific advisory committee providing advice on all aspects of health risk to humans exposed to natural and man-made radiation. It has, for over twenty years, investigated the incidence of childhood cancer and other cancers around nuclear sites. All reports can be found at http://www.comare.org.uk/

245 The results of the *Kinderkrebs in der Umgebung von Kernkraftwerken* (KiKK) study of childhood cancer in the vicinity of German nuclear power plants between 1980 and 2003 was published in

study, COMARE requested that a reanalysis of the UK childhood cancer data used in COMARE's tenth report be carried out using the same methodology as the KiKK study as far as was possible. This reanalysis – the Bithell paper[246] – was published in December 2008. It showed that, for the UK, the conclusions of the COMARE tenth report remained valid when applying methodology closer to that of the KiKK study on the same dataset.The tenth report did however state that for other nuclear sites the situation was more complicated. The study did demonstrate corresponding results to previously published studies that showed excesses of some types of childhood cancer. These results (excess childhood cancers in Seascale near Sellafield; in Thurso near Dounreay and around Aldermaston, Burghfield and Harwell) have been extensively discussed in previous COMARE reports.

C.8.114 In May 2011 COMARE published as its 14th report a further review of the incidence of childhood cancer around nuclear power stations, with particular reference to the KiKK study and COMARE's 10th and 11th reports. In this 14th report, COMARE found no reason to change its previous advice that there is no evidence to support the view that there is an increased risk of childhood leukaemia and other cancers in the vicinity of nuclear power stations due to radiation effects. COMARE also recommends that the Government keep a watching brief in this area.

C.8.115 The Appraisal of Sustainability notes that radioactive monitoring, carried out in 2009, found low concentrations of artificial radionuclides in water, sediment and beach samples and in meat and seafood samples taken around the existing Sizewell power stations. From this sampling, the estimated annual dose to the public from all sources within the Sizewell area was assessed as being less than 3% of the dose limit for members of the public of 1mSv per year as specified in the Ionising Radiations Regulations 1999[247].

2008 by the German Childhood Cancer Registry (DKKR), based on data from and designed in consultation with the Federal Office for Radiation Protection (BfS). The KiKK study found that there was a correlation between the distance of the home from the nearest nuclear power station at the time of diagnosis and the risk of developing leukaemia before the fifth birthday. However, it also noted that the exposure to ionising radiation in the vicinity of German nuclear power stations was lower by a factor of 1,000 to 100,000 than the exposure to natural background and medical radiation, and that therefore the findings of the study could not be explained in the present state of radiobiologic and epidemiologic knowledge.

246 Bithell et al, Radiation Protection Dosimetry 2008 132(2), Childhood leukaemia near British nuclear installations: methodological issues and recent results, pp191-197: http://rpd.oxfordjournals.org/cgi/content/abstract/132/2/191

247 Environment Agency. *Radioactivity In Food and the Environment* 2009 (RIFE 15) report, 2010. This monitoring is conducted annually and can be found at http://www.environment-agency.gov.uk/homeandleisure/110353.aspx

Detailed planning proposals for Sizewell

C.8.116 Responses were received about the detailed proposals that may come forward for the site, and in particular the possibility of the application including a road to access the site (in the area nominated in the Goose and Kenton Hills); the precise land take; and what marine landing facilities may be used.

C.8.117 The SSA has not assessed in detail proposals for associated works such as access roads. Such details could change without affecting the overall strategic suitability of the site. The Government believes that this type of proposal is more appropriately considered by the IPC. The IPC will need to consider detailed plans using the guidance provided within EN-1 and EN-6 including consideration of points made in any local authority impact report. Local authorities are a statutory consultee at the project development stage. See criterion D8 for further consideration of the area of the nomination for an access road.

Socio-economic impacts

C.8.118 Responses expressed concern on the effects of the construction and operation of the proposed power station in relation to the local community. Concerns included the effect of the influx of construction workers to the area, with particular reference to local traffic problems and social issues.

C.8.119 The Appraisal of Sustainability report notes that potential development at the Sizewell site is appraised as having positive effects of regional economic significance on employment and community viability. The site Appraisal of Sustainability report notes that there may be negative short term effects, during the construction of any new power stations, if the development results in a local shortage of specialist construction labour. It also noted that the influx of a large number of workers could bring pressure on basic services, housing and traffic routes.

C.8.120 The potential for impact on population dynamics from new power stations is noted in Section 5.12 of EN-1. The NPS directs the IPC to consider potential socio-economic effects of development when assessing development consent applications. These considerations should be made by the IPC, including consideration of any local authority impact report submitted. Local authorities are a statutory consultee at the project development stage.

C.8.121 See Section 5.12 of EN-1 on the consideration of socio-economic impacts.

Transport

C.8.122 Some responses referred to existing traffic issues on the A12 and a requirement for a bypass at Stratford/Farnham. It was mentioned that in previous Sizewell developments that it was agreed that heavy traffic would

not use the A1094. There was some concern about the route of the construction vehicles which it was felt may affect people who live locally. Some responses stated that use of a railway would be beneficial for transporting construction material, rather than using the local roads.

C.8.123 Development at the Sizewell site is assessed by the Appraisal of Sustainability as having the potential for some adverse impacts locally from additional traffic generated during construction and wider negative effects on regional road infrastructure.

C.8.124 The strategic level assessment undertaken by the Government did not include detailed traffic assessments as this will depend on a number of factors which aren't yet known such as the timing and phasing of development. Section 5.13 of EN-1 contains policy on consideration of traffic and transport impacts which would be undertaken should an application for development consent come forward.

Conclusion on the nominated site at Sizewell

C.8.125 Given that the site meets the SSA criteria, and having considered the evidence from, inter alia, the public, regulators, the Appraisal of Sustainability and Habitats Regulations Assessment site reports, the Government has concluded that the site is potentially suitable.

C.8.126 This assessment has outlined that there are a number of areas which will require further consideration by the applicant, the IPC and/or the regulators should an application for development consent come forward, including amongst other things effects and mitigating actions of coastal erosion, effects on biodiversity including the SSSI that is partially included in the site boundary, and the visual impact on the AONB. However, the Government has concluded that none of these factors is sufficient to prevent the site from being considered as potentially suitable.

C.9 Wylfa

Description of the site

C.9.1 The nomination site is located at Wylfa Head which extends into the Irish Sea from the north coast of Anglesey, some 15km north east of Holyhead, between Cemaes and Cemlyn Bays. It includes the headland south of Mynydd y Wylfa local nature reserve and extends eastwards to the western outskirts of the villages of Cemaes and Cemaes Bay, south to the A5025 and the village of Tregele and west to the Porth-y-pistyll inlet. The grid reference of the approximate centre of the nomination site is 235260, 393350. A map is included at the end of this annex.

C.9.2 The existing Wylfa nuclear power station is a Magnox power station which commenced operation in 1971 and is currently expected to operate until 2012.

Deployability by the end of 2025

C.9.3 The Strategic Siting Assessment (SSA) considered whether sites are credible for deployment by the end of 2025[248]. This is because it is important to focus on sites which can come on stream in good time to contribute to the Government's objectives on climate change and energy security.

C.9.4 At Wylfa, the Government notes in particular that there is already a great deal of knowledge about the site developed through the construction and operation of the adjacent power station. The Government also notes that a grid connection agreement is in place for a three stage connection at the Wylfa 400kV substation, giving a final transmission entry capacity of 3600MW by 31st October 2022. The first connection will be for 1200MW in late 2020 (although this does not automatically mean that a site will be deployed by that date).

C.9.5 The nominator, Horizon Nuclear Power, has announced plans to develop its first reactor at Wylfa, which would be commissioned "as early as 2020". It has submitted an Environmental Impact Assessment Scoping Report to the IPC in support of a request for a formal Scoping Opinion. A scoping report is an early stage in the planning process and sets out, amongst other things, a description of the proposed project, a summary of the key environmental issues and key impacts. In response, the IPC has issued a Scoping Opinion setting out what it expect the eventual Environmental Impact Assessment (which will accompany the application for development consent for Wylfa) to cover.

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248 For the purposes of this document, "deployment of new nuclear power stations" means commencing operation of one or more new nuclear power stations on the site.

C.9.6 The Government is satisfied from the information provided by nominators and an independent assessment that, at the point of publication, the Wylfa site is credible for deployment by the end of 2025, regardless of whether the site is deployed by that date.

Assessment of suitability against SSA criteria

C1: Demographics

Analysis

C.9.7 The Office for Nuclear Regulation has advised that the site does not exceed the semi-urban criterion.

C.9.8 Although some responses noted that the area around Wylfa is sparsely populated, others were concerned about the ability to institute an effective emergency plan to evacuate the required area.

C.9.9 As set out in Part 3 of this NPS, in complying with the conditions of the Nuclear Site Licence and legal obligations[249], all nuclear operators are required to specify and implement adequate arrangements for dealing with an incident or emergency arising on the site, and its effects. The emergency plan is to ensure that members of the public are properly informed and prepared, in advance, about what to do in the unlikely event of a radiation emergency occurring, and provided with information if a radiation emergency actually occurs. This would include an up to date assessment of evacuation routes for the areas which are considered relevant. Delineation of a new emergency plan is ultimately a decision for a local emergency planning authority on the advice of the Office for Nuclear Regulation, the site operator and others with roles in implementing the off-site emergency plan.

C.9.10 Development of appropriate emergency plans requires a detailed understanding of the nature of the local residential and working population, capability and redundancy of local infrastructure and capability of local emergency services. The potential of a site to meet emergency planning requirements cannot, in general, be assessed at a strategic level and has not been assessed in this case as part of the SSA.

Assessment

C.9.11 This site passes the demographics criterion.

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249 Under the Radiation (Emergency Preparedness and Public Information Regulations 2001 (REPPIR) http://www.hse.gov.uk/radiation/ionising/reppir.htm

C.9.12 For the purposes of the SSA the Government does not in general believe it is possible to determine, at a national level, the suitability of a site to meet emergency planning obligations.

Policy notes

C.9.13 See Part 3 of this NPS for information on demographics and emergency planning.

C2 and D5: Proximity to military activities

Analysis

C.9.14 The Ministry of Defence has advised that the site identified does not occupy any Ministry of Defence statutory safeguarding zones protecting aerodromes, explosive storage sites, technical sites or ranges and it is not within 1000 metres of any Ministry of Defence Danger Areas.

C.9.15 The Ministry of Defence has advised that no military firing activity occurs in the marine or landward areas adjoining the site. There are no military or explosive nuclear facilities within 1000 metres of the site. Responses highlighted concerns about the proximity of the site to civil aircraft movements and the Valley Area of Intense Aerial Activity that extends over North Wales and the Irish Sea, and in particular activity associated with RAF Mona and RAF Valley. The Ministry of Defence have confirmed that the site identified does not occupy the Military Air Traffic Zones that surround RAF Mona and RAF Valley or other types of air space managed by the Ministry of Defence. More generally, any new nuclear power station built on the site would be afforded some protection from any aviation activity by the establishment of a new or amended Restricted Area (see criterion D4: proximity to civil aviation).

C.9.16 The Ministry of Defence has advised that it is reasonable to conclude, at a strategic level, that any likely power station development within the site boundary can be protected against the risk of external hazards created by neighbouring military activities throughout its lifetime[250]. The Office for Nuclear Regulation has agreed with this advice.

C.9.17 The Ministry of Defence has also advised that it is reasonable to conclude, at a strategic level, that any likely power station development within the site boundary will not adversely affect the capabilities of the armed forces to carry out essential training and operations throughout its lifetime.

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250 See entry D2 in the table “The SSA criteria and how the sites were assessed” at the end of this Annex for details on the potential lifetime of the site and the period this assessment covers.

Assessment

C.9.18 Based on the advice of the Office for Nuclear Regulation and the Ministry of Defence it is reasonable to conclude that:

- the site does not occupy any Ministry of Defence areas which would give rise to the site being excluded from assessment;
- the site is not in proximity to any Ministry of Defence assets or activities that would suggest that it should be ruled out;
- any likely power station development within the site boundary can be protected against the risk of external hazards created by neighbouring military activities throughout its lifetime; and
- the development of a new nuclear power station at the site would not affect the capabilities of the armed forces to carry out essential training and operations throughout its lifetime.

C.9.19 This site therefore passes these criteria.

Policy notes

C.9.20 See Section 5.4 of EN-1 on Civil and Military Aviation and Defence Interests.

D1: Flooding, storm surge and tsunami

Analysis

Flood Zones

C.9.21 The site is in Flood Zone 1, low probability. This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%)[251]. The site levels are sufficiently higher than the Extreme Sea Level.

C.9.22 The Environment Agency has advised that, based on the current understanding of the flood risk in this area, it is reasonable to conclude that any potential new nuclear power station on the site could be protected against flood risk throughout its operational lifetime, including the potential

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251 See PPS25 for a full definition of the Flood Zones and what they cover: *Planning Policy Statement 25: Development and Flood Risk*, December 2006, Annex D, pp.22-25. See Section 3.7 of this NPS for information on the sequential approach that the Government has taken to flood risk in the Strategic Siting Assessment.

effects of climate change, storm surge and tsunami, and considering potential countermeasures.

C.9.23 The Environment Agency has advised that access and egress to and within the power station site is possible during extreme flood events, even up to the 0.1% annual event, although the route once off site may be compromised by localised fluvial flooding.

C.9.24 The Environment Agency has advised that it is very unlikely that any development would have any adverse impact with respect to flooding on the surrounding area.

Sea level rise and the effects of climate change

C.9.25 Waste will be stored in safe and secure interim storage facilities until a geological disposal facility becomes available. It is currently anticipated that disposal of new build wastes would begin once disposal of legacy wastes is completed. Geological disposal of higher activity waste from new nuclear power stations is currently expected to be available for new build waste from around 2130[252].

C.9.26 The Environment Agency has noted for all nominated sites that protecting the site from flood risk now and in the future prevents the coastline from changing and adapting naturally.

C.9.27 The Appraisal of Sustainability[253] has identified small potential adverse effects relating to flood risk due to rising sea levels, especially during the later stages of operation and decommissioning. This is considered a wider national issue, because of the potential impact on national energy supply and infrastructure. However, it is considered that the hard cliff geology and elevated nature of the site will afford adequate protection and that there is no need for coastal protection measures.

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252 On the assumption that spent fuel will be stored on-site until it can be disposed of, the key factors in determining the duration of on-site storage are the availability of a geological disposal facility (GDF) and the time required for the spent fuel to cool sufficiently for disposal in a GDF. The Nuclear Decommissioning Authority (NDA's) current indicative timetable anticipates a GDF being available to take spent fuel from new nuclear power stations from around 2130, although the future optimisation of plans for the implementation of geological disposal and the expected inventory for disposal indications may provide potential to bring forward this date. Optimisation work will also explore options for reducing the cooling time required for spent fuel prior to disposal. The Government will expect operators to ensure their waste is disposable when a GDF is anticipated to be available to take the waste. See Section B.4 of this NPS for more detail. An indicative timeline for Geological Disposal can be found at http://www.decc.gov.uk/assets/decc/What%20we%20do/UK%20energy%20supply/Energy%20mix/Nuclear/geological-disposal-board/982-geological-disposal-timeline.pdf

253 DECC, *Appraisal of Sustainability: site report for Wylfa*, October 2010, www.energynpsconsultation.decc.gov.uk

Assessment

C.9.28 This site passes this criterion. This takes into account in particular the low risk of flooding at the site and that the Environment Agency and Appraisal of Sustainability has advised that it is reasonable to conclude that any new nuclear power station on the site could be protected against flood risk throughout its lifetime, including the potential effects of climate change, storm surge and tsunami, taking into account possible countermeasures.

Policy notes

C.9.29 See Section 5.7 of EN-1 and Section 3.7 of this NPS on flood risk.

D2: Coastal processes

Analysis

C.9.30 The Appraisal of Sustainability has noted that the site is predominantly located on higher ground with hard bedrock. The risks from coastal flooding, sea level rise and erosion are therefore considered to be low. However, further assessment is required to determine the need for additional defences over the lifetime of a new power station.

C.9.31 The Environment Agency has advised that development at the site could avoid or mitigate the effects of coastal erosion or other landscape change scenarios throughout its lifetime, including the potential effects of climate change.

C.9.32 The Environment Agency has advised that, based on the current understanding of coastal erosion in the area, the site could potentially be protected from the effects of coastal erosion. The Shoreline Management Plan (SMP) (May 2001) describes the area around Wylfa Head as “Hard Rock Shore” and it is therefore at minimal risk of erosion.

Assessment

C.9.33 Given the low level of risk, the site passes this criterion. It is reasonable to conclude that the site could be protected against coastal erosion, including the effects of climate change, for the lifetime of the site.

Policy notes

C.9.34 See the relevant guidance in EN-1, including that on climate change adaptation and coastal change.

C.9.35 See the relevant guidance in Part 3 of this NPS including that on coastal change and on flood risk.

D3: Proximity to hazardous industrial facilities and operations

Analysis

C.9.36 The Office for Nuclear Regulation has advised that it reasonable to conclude that any likely power station development within the site boundary can be protected against risk arising from proximity to hazardous facilities throughout its lifetime, taking into account possible countermeasures.

Assessment

C.9.37 Responses highlighted that there are plans for a Liquified Natural Gas (LNG) facility at Amlwch.

C.9.38 The Office for Nuclear Regulation has advised that the site is located beyond the Land Use planning outer zone proposed for the shore-based Canatx LNG Ltd facility at Amlwch. Whilst there are proposals for an offshore offload facility and further redevelopment, given the distance of the development from the Wylfa site, this does not appear to affect the suitability of the site against this criterion.

C.9.39 Based on Health and Safety Executive records the site is not in the vicinity of any COMAH establishments[254]. The Office for Nuclear Regulation has advised that, as with all sites during licensing, the applicant to the Office for Nuclear Regulation will also need to take account of the need for countermeasures to protect nuclear operations from any hazards and risks from any nearby notified major hazard pipelines, based on information from the relevant pipeline operators about their routes and fluids being conveyed.

Assessment

C.9.40 This site passes against this criterion. Given the proximity to hazardous facilities it is reasonable to conclude that any likely power station development within the site boundary can be protected against risk arising from proximity to hazardous facilities throughout its lifetime, taking into account possible countermeasures. As part of their assessment of a proposed power station regulators consider the developer's estimation of the threats posed to the site by nearby hazardous facilities and any proposed mitigating action.

Policy notes

C.9.41 See Section 4.12 of EN-1.

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254 Under the Planning (Control of Major Accident Hazards) Regulations 1999. See http://www.hse.gov.uk/comah/background/comah99.htm# for more information

C.9.42 The applicant should demonstrate that it has consulted the Local Planning Authority where appropriate.

D4: Proximity to civil aircraft movements

Analysis

C.9.43 Responses highlighted concerns about the proximity of the site to civil aircraft movements, and the Valley Area of Intense Aerial Activity that extends over North Wales and the Irish Sea.

C.9.44 The Civil Aviation Authority has advised that it is potentially reasonable to conclude that any likely power station development within the site boundary can be protected against risks from civil aircraft movement. The Office for Nuclear Regulation has agreed with this advice. Nuclear power stations in the UK receive some protection from aviation activity through the establishment of a Restricted Area at each individual station. This is established by legislation[255]. Typically, such Restricted Areas have a radius of 2 nautical miles and extend vertically to 2000 feet above the surface. Any aviation activity within a Restricted Area is limited to that specifically permitted by the legislation.

C.9.45 The existing Wylfa nuclear installation has an associated Restricted Area. The Civil Aviation Authority has advised that a Restricted Area around the site (or an amendment to the existing Restricted Area) could provide a similar level of protection from civil aircraft movements.

C.9.46 The Civil Aviation Authority has also advised that it is potentially reasonable to conclude that neighbouring aerodromes and air traffic control areas can mitigate any effects arising from the Restricted Area around the nominated nuclear power site. In reaching this conclusion it has advised that it is not anticipated that any new Restricted Area established in association with the proposed nuclear installation would impact upon local aerodrome operations; that there are no other known (i.e. marked on Civil Aviation Authority approved charts or promulgated in the UK Aeronautical Information Publication) civilian landing sites in such proximity to the proposed nuclear installation that a new or amended Restricted Area would have a material impact on associated operations; and that the current establishment of the existing Wylfa Restricted Area is such that the impact of a new or amended Restricted Area (as described above) upon civil aircraft in transit through local airspace is likely to be negligible.

255 In accordance with Statutory Instrument 2007 No 1929 (The Air Navigation (Restriction of Flying) (Nuclear Installations) Regulations 2007)

Assessment

C.9.47 This site meets this criterion. Given the advice above it is reasonable to conclude that any likely power station development within the site boundary can be protected against risks from civil aircraft movement, and that the effects on air traffic and aerodromes can be potentially mitigated.

Policy notes

C.9.48 See the relevant guidance in EN-1, including that on civil and military aviation and defence interests. See the relevant guidance in Part 3 of this NPS, including that on proximity to aircraft movements.

For D5 see C2

D6: Internationally designated sites of ecological importance[256]

Analysis

C.9.49 The Appraisal of Sustainability site report[257] has identified that the potential for adverse effects on sites and species considered to be of European nature conservation importance means that significant strategic effects on biodiversity cannot be ruled out at this stage of the appraisal.

C.9.50 The Appraisal of Sustainability findings on sites of European nature conservation importance are drawn from the Habitats Regulations Assessment for Wylfa[258]. The key findings of the Habitats Regulations Assessment are limited by the strategic nature of the assessment process and the information available, which does not generally allow for a definitive prediction of effects on the European Sites considered. However, a precautionary approach suggests that at this strategic level the assessment cannot rule out the potential for adverse effects on site integrity at six European Sites (Cemlyn Bay Special Area of Conservation) SAC, Ynys Feurig, Cemlyn Bay and The Skerries SPA, Menai Strait and Conwy Bay SAC, Liverpool Bay Special Area of Protection (SPA), Lavan Sands SPA and Puffin Island SPA) through potential impacts on water resources and quality, habitat (and species) loss and fragmentation/ coastal squeeze, disturbance (noise, light and visual), and air quality.

C.9.51 The Habitats Regulations Assessment has proposed a suite of avoidance and mitigation measures to be considered as part of any project level

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256 These are occasionally referred to as “European Sites”, “European designated sites”, or “sites of European importance”. See entry D6 in the table “The SSA criteria and how the sites were assessed” at the end of this annex for details of these designations and what they cover.

257 See footnote 253

258 DECC, *Habitats Regulations Assessment: site report for Wylfa*, October 2010, www.energynpsconsultation.decc.gov.uk

Habitats Regulations Assessment. At this stage, it is assessed that the effective implementation of these mitigation measures may help to address adverse effects on European Site integrity, but that more detailed project level Habitats Regulations Assessment is required in order to draw conclusions on their effectiveness.

C.9.52 There was a concern regarding the assessment within the Habitats Regulations Assessment that no adverse effects would result from water resources and quality impacts on the Llyn Dinam SAC. Llyn Dinam SAC has been considered in the updated Wylfa Habitats Regulations Assessment site report. It has confirmed the results of the assessment that there would be no impact on water quality. The Habitats Regulations Assessment site report also states that a detailed assessment of the groundwater connections between Llyn Dinam SAC and Wylfa should be considered at the detailed project stage.

Assessment

C.9.53 The Government notes the scope for avoidance and mitigation identified in the Habitats Regulations Assessment, and the need for more detailed studies should an application for development consent come forward. Given that the Habitats Regulations Assessment has not been able to rule out adverse impacts on sites of European nature conservation importance, the Government has carefully considered against this criterion whether it is appropriate to include this site in this NPS.

C.9.54 Annex A of this NPS sets out that the Government has concluded that there is an Imperative Reason of Overriding Public Interest that favours the inclusion of this site in the draft Nuclear NPS despite the inability to rule out adverse effects on European Sites at this stage. This takes into account the need for sites to be available for potential deployment by the end of 2025, the lack of alternatives, and the consideration given to compensatory measures. This site therefore passes this criterion.

Policy notes

C.9.55 See the relevant guidance in EN-1, including that on the Environmental Statement, Habitats Regulations Assessment and biodiversity and geological conservation. See the relevant guidance in Part 3 of this NPS, including that on biodiversity and geological conservation.

C.9.56 The IPC should also refer to the Appraisal of Sustainability and Habitats Regulations Assessment for Wylfa and consider whether the applicant's proposals have sufficiently taken into account the issues identified, where they are still relevant.

D7: Nationally designated sites of ecological importance

Analysis

C.9.57 The Appraisal of Sustainability identified that the potential for adverse effects on sites and species considered to be of national nature conservation importance. Significant strategic effects on biodiversity cannot therefore be ruled out at this stage of the appraisal.

C.9.58 The Appraisal of Sustainability has identified that there could be potential significant effects at the following Sites of Special Scientific Interest (SSSIs) which are within 5km of the site: Tre'r Gof SSSI; Cemlyn Bay SSSI; Cae Gwyn SSSI.

C.9.59 Tre'r Gof SSSI is located within the site boundary and the Appraisal of Sustainability finds that this rich-fen habitat could suffer direct or indirect effects associated with changes to water quality or quantity. In the nomination report, the nominator stated that it is anticipated sufficient land is available within the site for the development of a new nuclear power station without permanently affecting any designated area. The nominator also stated that Tre'r Gof SSSI could be protected through a variety of engineered drainage mitigation measures to preserve surface and groundwater quality and quantity including protection of the mineral rich waters and hence protect the overall ecology of the SSSI. The Appraisal of Sustainability site report has identified that there is the potential for the mitigation of biodiversity effects on sites of national conservation importance, including the creation of replacement habitat.

Assessment

C.9.60 The Government notes that the Appraisal of Sustainability has identified potential impacts on nationally designated sites of ecological importance which it considers of strategic significance. Given the scope for mitigation of biodiversity effects identified in the Appraisal of Sustainability for sites of national importance it is reasonable to conclude that it may be possible to avoid or mitigate impacts to an extent- The Appraisal of Sustainability has, however, highlighted that the proximity of Tre'r Gof SSSI (within the site boundary) means that it is possible that there could be direct or indirect effects at this site.

C.9.61 The Government has carefully considered whether this site meets this criterion. Given the need to ensure sufficient sites are available for development to meet the Government's energy policy objectives, as described in Part 2 of this NPS, the Government believes that it does. In view of the need for sites set out in Part 2 and the limited number of potentially suitable sites, the Government does not think the issues in relation to this criterion are sufficient to justify not including the site in this NPS. The Government has also noted that there will be further assessment of any proposal for the site at project level and that EN-1 sets out the

detailed consideration that must be given to issues relating to nationally designated sites should an application for development consent come forward.

C.9.62 This site passes this criterion.

Policy notes

C.9.63 See the relevant guidance in EN-1, including that on the Environmental Statement and biodiversity and geological conservation. See the relevant guidance in Part 3 of this NPS, including that on biodiversity and geological conservation.

C.9.64 The IPC should also refer to the Appraisal of Sustainability for Wylfa and consider whether the applicant's proposals have sufficiently taken into account the issues identified, where they are still relevant.

D8: Areas of amenity, cultural heritage and landscape value

Analysis

C.9.65 Some responses expressed concern regarding the Anglesey Area of Outstanding Natural Beauty (AONB), Snowdonia National Park and North Anglesey Heritage Coast given the possible visual and landscape impact from a new development.

C.9.66 The Appraisal of Sustainability has also identified potential adverse effects on landscape. These include lasting adverse indirect landscape and visual impacts on the surrounding area, including on parts of Anglesey AONB (small parts of which are within the site boundary) and North Anglesey Heritage Coast (which extends to within 125m of the site). This is of potential wider significance due to the national designation of the AONB, which was also raised in responses. The nominator[259] notes that "pragmatically it would not be possible to completely avoid all visual impacts on the Heritage Coast and the AONB and it is possible that a sea wall may be required at Porth y Pistyl. However the intention would be to maintain some distance between the nuclear power plant facility and the perimeter of the nomination site near the designated coastline." The nominator envisages that mitigation measures may include: arranging the layout of the site to minimise loss of visual amenity from sensitive viewpoints as far as practical; the use of colour schemes which blend the structures with the background; the use of on-site and if necessary off-site landscaping and planting to help screen the site especially from the more

259 RWE nPower and the Nuclear Decommissioning Authority (NDA).

sensitive viewpoints; and designing any indirect cooling system which requires cooling towers to give acceptable visual impacts[260].

C.9.67 The Appraisal of Sustainability considers that, whilst currently the exact placing of any new nuclear power station is unknown as a large site has been nominated, some adverse impact, which may not be fully mitigatable, is anticipated.

C.9.68 The Appraisal of Sustainability identified potential adverse effects on Scheduled Monuments, a registered garden and listed buildings, which may be of regional or national heritage significance.

C.9.69 These potential impacts arise because the setting of cultural or historic features may be affected by a new nuclear power station, depending on the distance to any new nuclear power station, the sight lines, and any mitigation applied. The Appraisal of Sustainability[261] identifies the cultural and historic features in the area including the registered Cestyll Garden, which lies immediately to the west of the site boundary, the Bronze Age standing stones Scheduled Monument 1km to the south, three Grade II listed buildings in Cafnan to the west of the site, and listed buildings around Cemaes[262]. The Appraisal of Sustainability finds that it should be possible to mitigate against the potential adverse effects on scheduled monuments although further detailed assessment at project level will be required.

Assessment

C.9.70 In assessing this site the Government has considered the purpose of the AONB, which is of conserving and enhancing the natural beauty of the area of outstanding natural beauty.

C.9.71 Whilst the new power station will be seen within the context of the existing power station before decommissioning, given the likely scale of the development and the fact that a small part of the AONB is included in the nominated boundary, the Appraisal of Sustainability finds that there are likely to be some long lasting adverse direct and indirect effects on landscape character and visual impacts on the AONB. Whilst there is the potential for mitigation, it is possible that some impact may remain.

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260 See www.energynpsconsultation.decc.gov.uk the nomination documents for Wylfa, and in particular the nomination form.

261 See the *Appendices to the Appraisal of Sustainability: site report for Wylfa*, October 2010, www.energynpsconsultation.decc.gov.uk

262 Grade I buildings are of exceptional interest, sometimes considered to be internationally important. Grade II* buildings are particularly important buildings of more than special interest. Grade II buildings are nationally important and of special interest. See: http://www.english-heritage.org.uk

C.9.72 This could have an effect on the purpose of the designation. To further understand these effects and the effectiveness of the mitigating actions proposed by the nominator of the site, further detailed assessment at project level is required, possibly through the provision an integrated landscape, heritage and architectural plan.

C.9.73 Whilst scope for total avoidance and mitigation of impacts on the National Park is limited, this site passes this criterion. This takes into account the fact that the nature, scope, and scale of any effect is currently uncertain and is dependent on the exact form of development proposed and that there is some scope for a developer and the IPC to explore, in detail, minimisation, avoidance and mitigation of adverse effects. The Government recognises that whilst there is some potential for partial minimisation and mitigation of the effects, there could be remaining effects on the AONB. However, as explained in Part 2 of this NPS, there is a need to ensure sufficient sites are available for development to meet the Government's energy policy objectives. In view of this and in view of the limited number of potentially suitable sites, the Government does not think the issues in relation to this criterion are sufficient to justify (against this criterion) not including the site in this NPS. The Government has also noted the fact that there will be further detailed assessment of any proposal for the site should any application for development consent come forward. It was noted in responses that 'LANDMAP' assessments of the area had not been referenced when assessing landscape impacts. The LANDMAP landscape assessment of the area is a valuable resource, and would be considered when formulating the Environmental Impact Assessment at the project stage of development.

C.9.74 However, the IPC will have to examine any future application for development consent at the site in accordance with EN-1, Part 3 of this NPS and in light of the full assessment of the project at that time. The potential for remaining effects can only be fully assessed when detailed plans come forward. This is because they depend on a range of factors including the proposals for minimisation and mitigation, the cooling technology proposed and location of transmission infrastructure, and the relevant other development in the area to be factored when considering cumulative effects.

C.9.75 The boundary of Snowdonia National Park is approximately 36km from the site. Any applications for development consent for nationally significant grid infrastructure will be considered by the IPC within the framework of the Electricity Networks NPS (EN-5). Applicants are required to consult local communities about their plans before submitting them to the IPC. Should there be impacts on the National Park arising from grid infrastructure, these would also be considered using the guidance in Part 5.9 of EN-1 which states, amongst other things, that National Parks and AONBs have been confirmed by the Government as having the highest status of protection in relation to landscape and scenic beauty.

C.9.76 The Government also notes that there may be some visual impacts on the setting of other cultural heritage features in the area. Impact and mitigation measures will need to be considered by the IPC, but at this stage the potential effects are not felt sufficient to outweigh the need for sites as set out in Part 2 of this NPS, particularly given the need for further investigation and the scope for some mitigation that has been identified.

Policy notes

C.9.77 See the relevant guidance in EN-1 and Part 3 of this NPS, including that on landscape and visual impacts. The IPC should also refer to the Appraisal of Sustainability and the applicant's proposals for Wylfa and consider whether the applicant's proposals sufficiently avoid or mitigate potential impacts where they are still relevant.

C.9.78 It should also be noted that whilst the Appraisal of Sustainability has noted the potential strategic environmental and sustainability implications of transmission infrastructure, detailed environmental assessment should be made by the applicant at the IPC stage, and this would be considered in conjunction with EN-5, the Electricity Networks NPS.

D9: Size of site to accommodate operation

Analysis

C.9.79 The nominated area is around 232 hectares. Based on the advice of the Office for Nuclear Regulation there is enough land within the boundary of the site for the safe and secure operation of at least one new nuclear power station.

C.9.80 The nominated land has a public road and a number of tracks and footpaths bisecting it. It is a security requirement that the licence applicant has exclusive rights of access to, and control of, a civil licensed nuclear site and that it is not therefore bisected by any public rights of way.

C.9.81 Some responses were concerned about the possible impact of development on existing and future footpaths within the site boundaries.

Assessment

C.9.82 Based on the advice of the Office for Nuclear Regulation it is reasonable to conclude that there is enough land within the boundary nominated to safely and securely operate at least one new nuclear power station, including the safe and secure storage of all the spent fuel and intermediate level waste produced through operation, and from decommissioning, on the site of the station until it can be sent for disposal in a geological disposal facility. An applicant would need to consider mitigating actions such as siting elements of a station away from public footpaths, or realignments, to meet the requirements of a nuclear site licence. Given the size of the site it is

reasonable to conclude that there is the potential to mitigate these concerns.

C.9.83 Section 5.10 of EN-1 (Land Use including open space, green infrastructure and green belt) sets out that rights of way, National Trails and areas of access to land (e.g. open access land) are important recreational facilities and that mitigation measures should be considered by the applicant or the IPC as necessary. It also sets out the importance for consideration of coastal recreation and access to the coast. The IPC will consider the implications for development of the creation of a continuous signed and managed route around the coast, as set out in the Marine and Coastal Access Act 2009, using the guidance in EN-1.

Policy notes

C.9.84 The safety and security of a nuclear power station is considered by the Office for Nuclear Regulation as part of the licensing regime. See Part 3 of this NPS for guidance on the relationship between the regulatory framework and the planning regime.

C.9.85 Part 4 of EN-1 (Socio-economic) advises that an application should have taken into account the location of public rights of way, including footpaths, bridleways and byways and minimised hindrance to them where possible.

C.9.86 See Section 5.10 of EN-1 on Land Use including open space, green infrastructure and green belt for information on rights of way and coastal access.

D10: Access to suitable sources of cooling

Analysis

C.9.87 The Environment Agency has advised that it is potentially reasonable to conclude that there is access to suitable sources of cooling at the site. The nominator expresses a preference for direct cooling from the sea[263].

C.9.88 The Environment Agency has advised that this coastline provides important nursery grounds for bass and flatfish specifies, and there are important local populations of migratory salmonids. The siting of intakes and outfalls of cooling water should be carefully considered to minimise impacts where appropriate.

C.9.89 The Appraisal of Sustainability has noted that although there are existing discharges from the current Wylfa nuclear power station, the return of cooling water to the sea at elevated temperatures could have adverse

263 See footnote 260.

effects on coastal processes including sediment transport and water quality. Discharges could cause failures to existing water quality standards and indirectly affect nationally and internationally designated habitats. The Environment Agency has also advised that any potential impacts would be assessed during detailed design and considered in any application for a consent to make discharges. This would require the discharges to meet regulatory standards for the protection of the quality of estuarine or coastal waters in line with future requirements of the Water Framework Directive[264].

C.9.90 However, the Appraisal of Sustainability has also noted that in siting the cooling water facilities, the high velocity current regime offshore of the site is ideal for diluting and dissipating the environmental impacts of discharged heated water. A dispersion and dilution model should be used to determine the fate of the effluent plume.

Assessment

C.9.91 Given the advice above, it is reasonable to conclude that there is access to suitable sources of cooling at this site. This site passes this criterion. The detailed modelling requested below will give greater certainty on the potential effects and mitigating actions.

Policy notes

C.9.92 See the relevant guidance in EN-1, including Section 5.3 on biodiversity and Section 5.5 on coastal change, given that a new development may require offshore infrastructure for intake and outfall.

C.9.93 See the relevant guidance in Part 3 of this NPS, including that on water quality and resources.

C.9.94 See Part 3 of this NPS for guidance on the relationship between the regulatory framework and the planning regime.

Appraisal of Sustainability and Habitats Regulations Assessment for Wylfa

C.9.95 The Planning Act 2008[265] requires an Appraisal of Sustainability to be carried out for all NPSs. The purpose of an Appraisal of Sustainability is to consider the social, economic and environmental impacts of the policy and to suggest possibilities for improving the sustainability of the NPS. The purpose of the Appraisal of Sustainability for Wylfa is to examine the

264 The Water Framework Directive: Directive 2000/60/EC establishing a framework for Community action in the field of water policy

265 The Planning Act 2008

potential positive and negative effects of the nominated site, identify the significance of these effects, and suggest any mitigation possibilities.

C.9.96 The NPS has also been assessed in accordance with the European Habitats Directive. That assessment (the "Habitats Regulations Assessment") tests whether a plan or project could have an adverse effect on the integrity of European Sites of nature conservation importance. A Habitats Regulations Assessment was carried out on the Wylfa site.

C.9.97 The key findings of the Wylfa Appraisal of Sustainability and Habitats Regulations Assessment highlight areas of significance on, amongst other things:

i) potential negative effects on four national and internationally protected nature conservation sites, namely Cemlyn Bay SAC, the Yns Feurig, Cemlyn Bay and the Skerries SPA;

ii) erosion and flooding. The site is predominantly located on higher ground with hard bedrock and the risks are therefore considered to be low although further assessment is required to determine the need for additional defences over the lifetime of a new power station;

iii) cooling: coastal water conditions at the site are considered generally favourable for the dispersion of the heated water that would be released after cooling;

iv) development of a new nuclear power station will have a negative visual impact on the local and sub-regional landscape, particularly the Anglesey AONB (part of which lies within the site boundary) and North Anglesey Heritage Coast. Currently the exact placing of a new nuclear power station is unknown as a large site has been nominated, but some adverse impact, which may not be fully mitigatable, is anticipated by the Appraisal of Sustainability;

v) potential for long term positive effects associated with enhanced employment and long term prosperity for communities at the local level.

C.9.98 Key findings i) – iv) are taken into account in the summaries against the SSA criteria above. For further detail on v) see the Appraisal of Sustainability for Wylfa. Wylfa is not close to any other nominated site and therefore does not form part of a cluster. The Appraisal of Sustainability considered that this means that regional or sub-regional cumulative effects are not considered relevant for this site.

Other issues raised during the assessment

C.9.99 This section deals with other common issues at this site that were raised in responses.

Health

C.9.100 The Appraisal of Sustainability for Wylfa has considered strategic effects on human health and well being. The Appraisal of Sustainability looks at a range of different factors and should be referred to for a more in depth assessment.

C.9.101 The Appraisal of Sustainability has found that the rigorous system of regulation of routine discharges from any new nuclear power station at Wylfa should ensure that there are no unacceptable risks to the health of the local population under normal operating conditions.

C.9.102 The Appraisal of Sustainability also concludes that there is a very small risk of adverse health impacts arising from an accidental release of radiation but the multiple safety features within modern nuclear plants makes such an event exceedingly unlikely. Section 3.13 of this NPS (Human health and wellbeing) sets out that the risk of an accident resulting in exposure to radiation for workers, the public and the environment is very small because of the UK's strict regulatory regime. Section 3.13 should be referred to for further guidance.

C.9.103 It is possible that the presence of a nuclear power station may lead to increased stress levels in certain individuals. Overall, the Appraisal of Sustainability finds that likely enhancement in employment, community wealth, housing stock and other associated neighbourhood infrastructure should improve community well-being and health generally.

C.9.104 Responses were particularly concerned about whether there were links between nuclear power stations and cancer. This has been the subject of the work of the Committee on Medical Aspects of Radiation in the Environment (COMARE)[266]. Its view is that there is no evidence for unusual aggregations of childhood cancers in populations living near nuclear power stations in the UK.

C.9.105 COMARE's tenth report considered the incidence of childhood cancer around nuclear installations. These were divided into nuclear power generating stations and other nuclear installations. The results for the power generating stations supported the conclusion that 'there is no evidence from this very large study that living within 25km of a nuclear generating site in Britain is associated with an increased risk of childhood cancer'.

C.9.106 In its eleventh report COMARE examined the general pattern of childhood leukaemia within Great Britain and concluded that 'the search for increased

266 COMARE is an independent scientific advisory committee providing advice on all aspects of health risk to humans exposed to natural and man-made radiation. It has, for over twenty years, investigated the incidence of childhood cancer and other cancers around nuclear sites. http://www.comare.org.uk/

risk levels near to nuclear power generation sites shows no pattern of excess cases of childhood cancer close to the sites of these types of nuclear installations' Among its recommendations, the report said that the incidence of childhood leukaemia and other cancers in the vicinity of Sellafield and Dounreay, which are not power generating stations, was raised and should be kept under surveillance and periodic review.

C.9.107 Responses raised particular concerns about the findings of the KiKK study[267] undertaken in Germany. Following the publication of the KiKK study, COMARE requested that a reanalysis of the UK childhood cancer data used in COMARE's tenth report be carried out using the same methodology as the KiKK study as far as was possible. This reanalysis – the Bithell paper[268] – was published in December 2008. It showed that, for the UK, the conclusions of the COMARE tenth report remained valid when applying methodology closer to that of the KiKK study on the same dataset.The tenth report did however state that for other nuclear sites the situation was more complicated. The study did demonstrate corresponding results to previously published studies that showed excesses of some types of childhood cancer. These results (excess childhood cancers in Seascale near Sellafield; in Thurso near Dounreay and around Aldermaston, Burghfield and Harwell) have been extensively discussed in previous COMARE reports.

C.9.108 In May 2011 COMARE published as its 14th report a further review of the incidence of childhood cancer around nuclear power stations, with particular reference to the KiKK study and COMARE's 10th and 11th reports. In this 14th report, COMARE found no reason to change its previous advice that there is no evidence to support the view that there is an increased risk of childhood leukaemia and other cancers in the vicinity of nuclear power stations due to radiation effects. COMARE also recommends that the Government keep a watching brief in this area.

C.9.109 Radioactive monitoring carried out in 2009 found generally low concentrations of artificial radionuclides attributable to the existing Wylfa nuclear power station in water, sediment and beach samples and in meat

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267 The results of the *Kinderkrebs in der Umgebung von Kernkraftwerken* (KiKK) study of childhood cancer in the vicinity of German nuclear power plants between 1980 and 2003 was published in 2008 by the German Childhood Cancer Registry (DKKR), based on data from and designed in consultation with the Federal Office for Radiation Protection (BfS). The KiKK study found that there was a correlation between the distance of the home from the nearest nuclear power station at the time of diagnosis and the risk of developing leukaemia before the fifth birthday. However, it also noted that the exposure to ionising radiation in the vicinity of German nuclear power stations was lower by a factor of 1,000 to 100,000 than the exposure to natural background and medical radiation, and that therefore the findings of the study could not be explained in the present state of radiobiologic and epidemiologic knowledge.

268 Bithell et al, Radiation Protection Dosimetry 2008 132(2), Childhood leukaemia near British nuclear installations: methodological issues and recent results, pp191-197: http://rpd.oxfordjournals.org/cgi/content/abstract/132/2/191

and seafood samples taken from around the existing site. However, the presence in the area of radionuclides from other nuclear activities (including the Sellafield reprocessing plants and mixed oxide fuel manufacture) makes the apportioning of radiological effects in this location very difficult. Nevertheless, from this sampling, the estimated total annual dose to the public from all sources within the Wylfa area was assessed as being less than 2% of the dose limit for members of the public of 1mSv per year as specified in the Ionising Radiations Regulations 1999[269].

Comments on socio-economic effects

C.9.110 Some responses expressed concerns that an influx of workers into the area could be damaging to its language, culture and welfare. However, some responses also argued that socio-economic considerations should be a factor in deciding whether a site was potentially suitable and said that Government had not given sufficient weight to this. It was stated that unemployment in Anglesey is high and that the benefits a new nuclear power station would bring should be a key factor in the decision whether to list the site on the Nuclear NPS.

C.9.111 The potential for impact on population dynamics is highlighted in Section 5.12 of EN-1. The NPS directs the IPC to consider potential socio-economic effects of development when assessing development consent applications, and this will be done at a point when it is clearer how many workers would be required for a development, or what proportion of these would have to come from outside the local area. Local authorities are a statutory consultee at the project development stage and may submit an impact report to the IPC.

Seismic risk

C.9.112 A concern was raised about the seismic risk to any new power station, with regard to the Dinorwic fault line which is part of the Menai Strait fault line.

C.9.113 As outlined in the Government Response to the consultation on the SSA Criteria[270] the Office for Nuclear Regulation has advised that seismic risk is more appropriately assessed at site licensing stage when detailed site specific and reactor design information is available. Seismic hazard was therefore identified as an SSA criteria which is flagged for local

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269 Environment Agency, *Radioactivity In Food and the Environment* 2009 (RIFE 15) report, 2010. This monitoring is conducted annually and can be found at http://www.environment-agency.gov.uk/homeandleisure/110353.aspx

270 BERR, Towards a nuclear national policy statement: Government response to the consultation on the Strategic Siting Assessment process and criteria, January 2009, p.38, http://www.berr.gov.uk/files/file47136.pdf URN09/581

consideration[271]. In order to ascertain the presence and status of any capable faults on a site, there would need to be extensive geological investigations and associated laboratory testing. The Government's view is that at a strategic level it is not practical to ascertain, with a high degree of confidence, the status of faults on a site. The licensing and therefore operation of the station is still contingent on these issues being satisfactorily resolved.

C.9.114 In order to satisfy the regulators that site licence conditions will be met, the designers of the plant will need to demonstrate that the installed plant is able to withstand all site-specific natural hazards including earthquake, flooding or meteorological conditions.

C.9.115 It is noted that seismic activity levels across the UK are generally low and the reactor designs being considered under the Generic Design Assessment process are intended for worldwide application, with baseline seismic resistance designs in the area of 0.25g-0.5g peak ground acceleration.

C.9.116 This does not therefore affect the potential suitability of the site as part of the SSA.

Conclusion on the nominated site at Wylfa

C.9.117 Given that the site meets the SSA criteria, and having considered the evidence from, inter alia, the public, regulators, the Appraisal of Sustainability and Habitats Regulations Assessment site reports, the Government has concluded that the site is potentially suitable.

C.9.118 This assessment has outlined that there are a number of areas which will require further consideration by the applicant, the IPC and/or the regulators should an application for development consent come forward, including amongst other things its effect on the AONB and Heritage Coast and on Tre'r Gof SSSI. However, the Government has concluded that none of these factors is sufficient to prevent the site from being considered as potentially suitable.

271 Flags for Local Consideration are siting criteria that were identified through the SSA consultation in 2008, but which (usually due to the need for detailed site-specific investigations and data) would be more appropriately assessed at the project level.

Maps supporting the Strategic Siting Assessment

There are a number of maps that are relevant to the sites listed in this NPS.

For each site there is the map provided by the nominator. This shows the area nominated by means of a boundary on an Ordnance Survey map at 1:10,000 scale.

Where relevant there are also maps that pertain to the assessment of sites against the Strategic Siting Assessment (SSA) criteria. These maps relate to three criteria:

- **C1 Demographics**: these maps show where a nominated site, or an area near to a nominated site, exceeds the semi urban criterion.
- **D3 Proximity to hazardous industrial facilities and operations**: these maps show where the land use planning consultation zones of facilities subject to the Control of Major Accidents and Hazards Regulations intersect with a nominated site[272].
- **D9 Size of site to accommodate operation**: these maps show where within a nominated site boundary there is insufficient land to provide effective defence-in-depth for a nuclear reactor, including the associated turbine hall, spent fuel, and intermediate level waste stores.

These issues only arose at certain sites, so there is not a corresponding map for every site.

Maps in order of appearance:

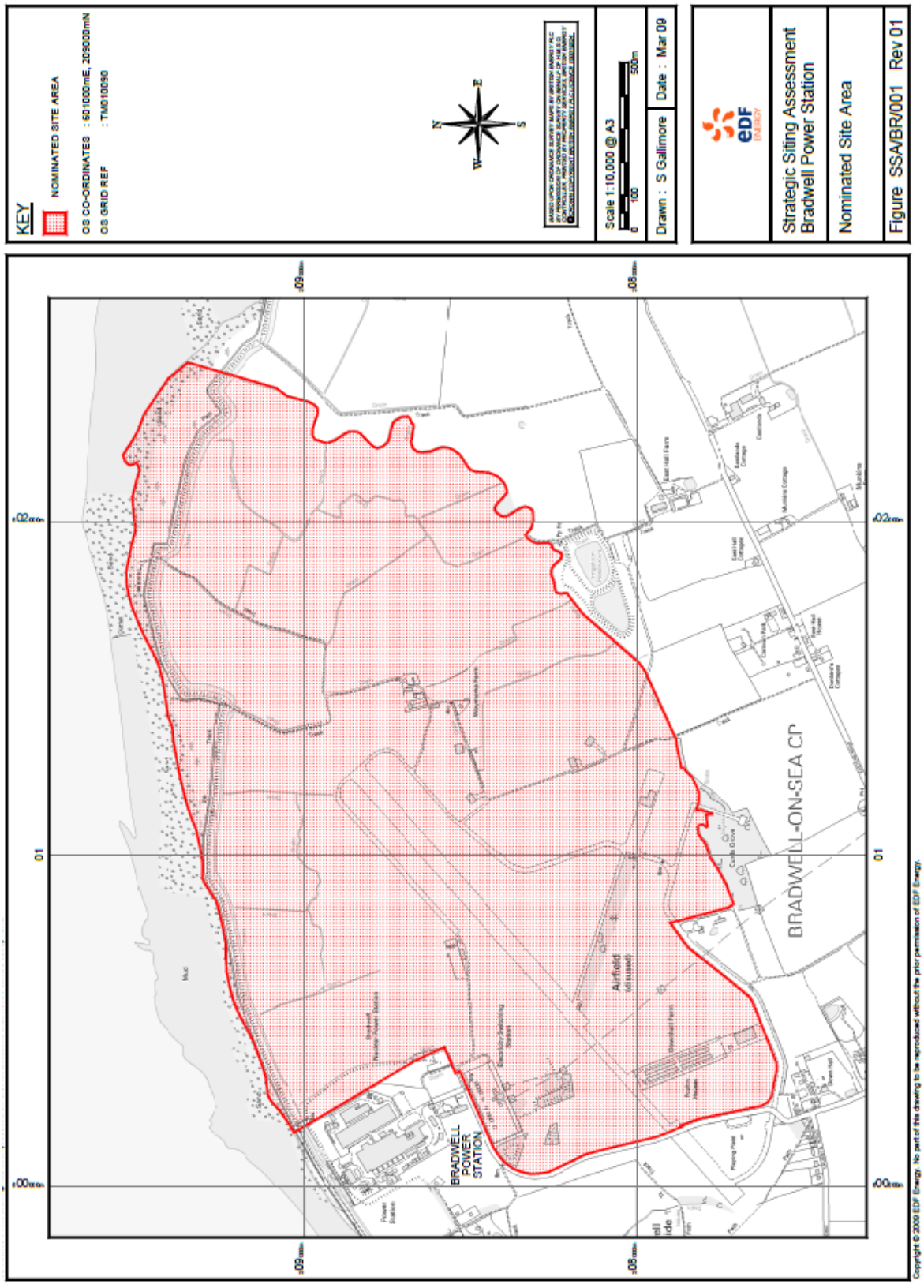
Bradwell	Nominator map of site
	D3: Proximity to hazardous industrial facilities and operations
Hartlepool	Nominator map of site
	C2: Demographics
	D3: Proximity to hazardous industrial facilities and operations
	D9: Size of site to accommodate operation
Heysham	Nominator map of site
	C2: Demographics
	D3: Proximity to hazardous industrial facilities and operations
	D9: Size of site to accommodate operation

[272] A COMAH site under the Planning (Control of Major Accident Hazards) Regulations 1999. For more information see: http://www.hse.gov.uk/comah/background/comah99.htm#

Hinkley Point	Nominator map of site
	D9: Size of site to accommodate operation
Oldbury	Nominator map of site
Sellafield	Nominator map of site
	D9: Size of site to accommodate operation
Sizewell	Nominator map of site
	C2: Demographics
	D9: Size of site to accommodate operation
Wylfa	Nominator map of site

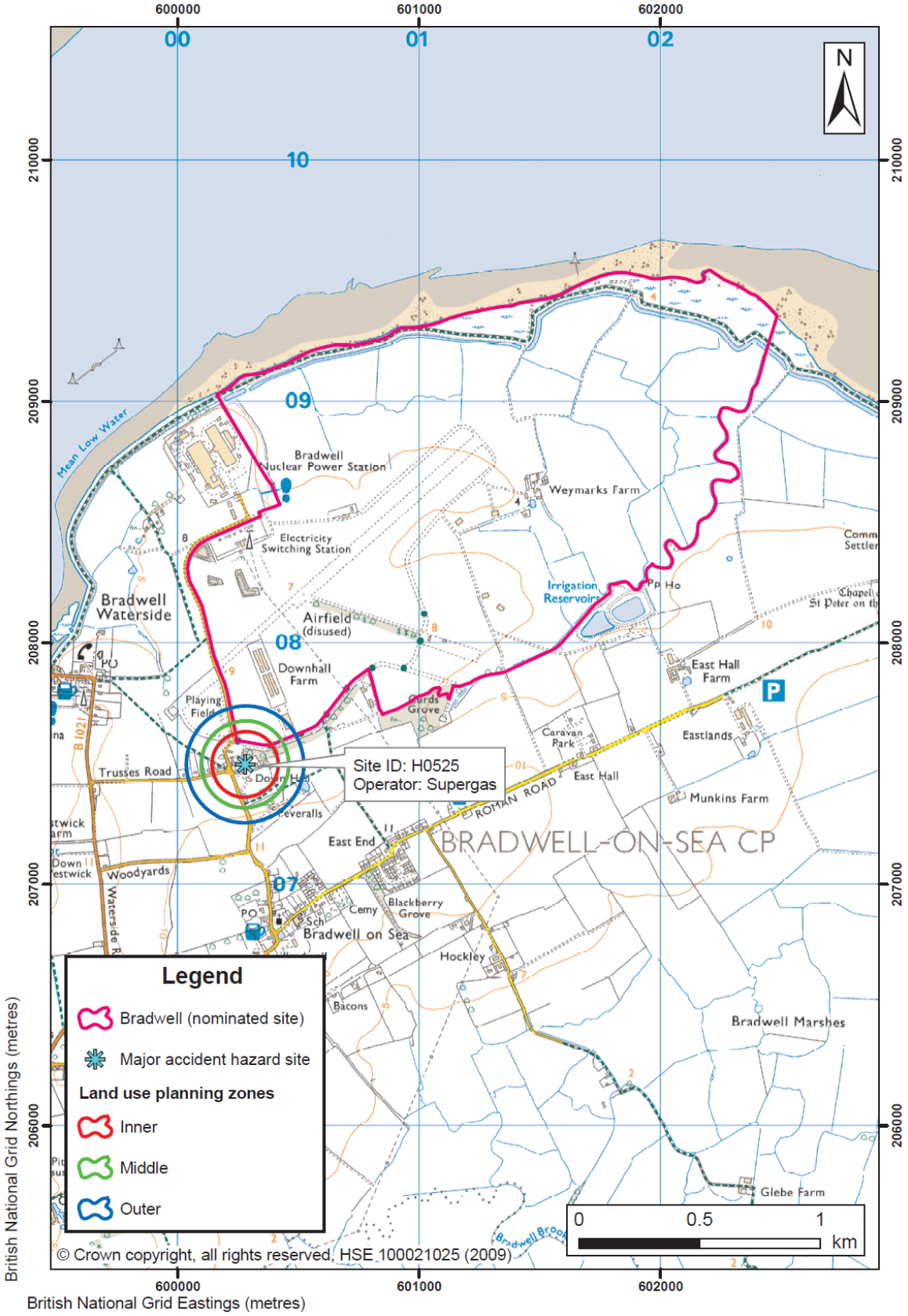
Bradwell

Nominator map of site



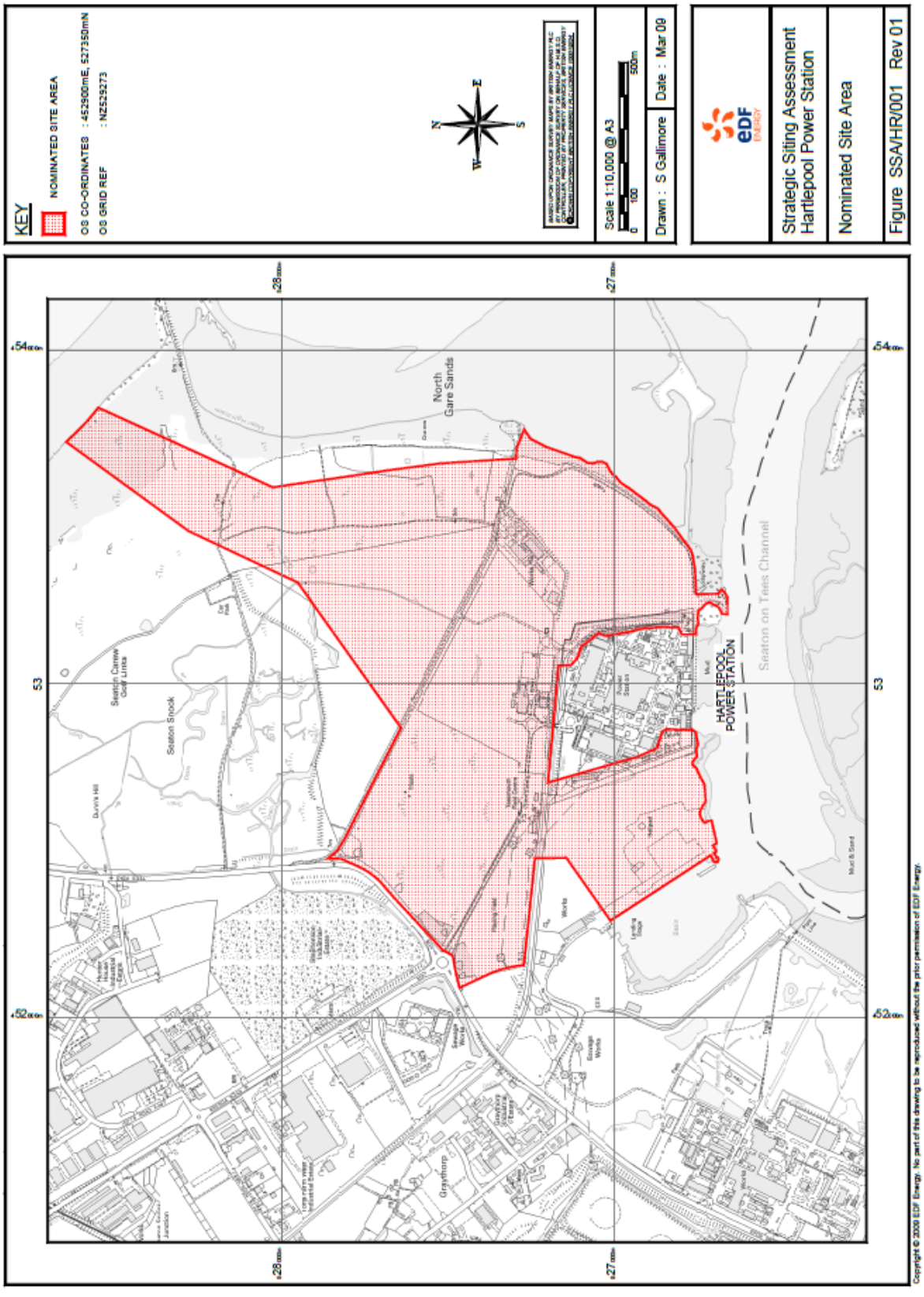
Bradwell

D3: Proximity to hazardous industrial facilities and operations



Hartlepool

Nominator map of site

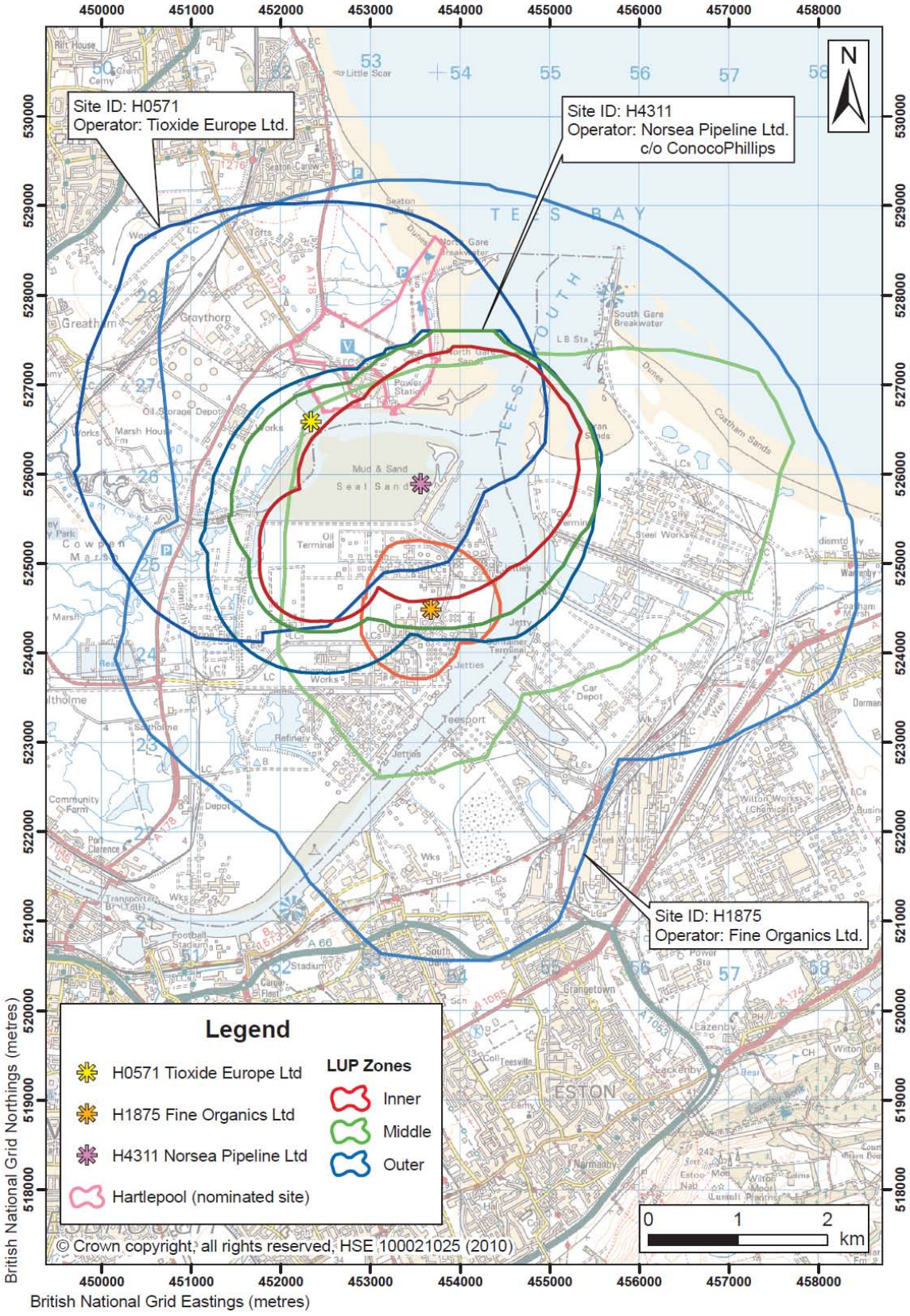


Hartlepool C2:

Demographics

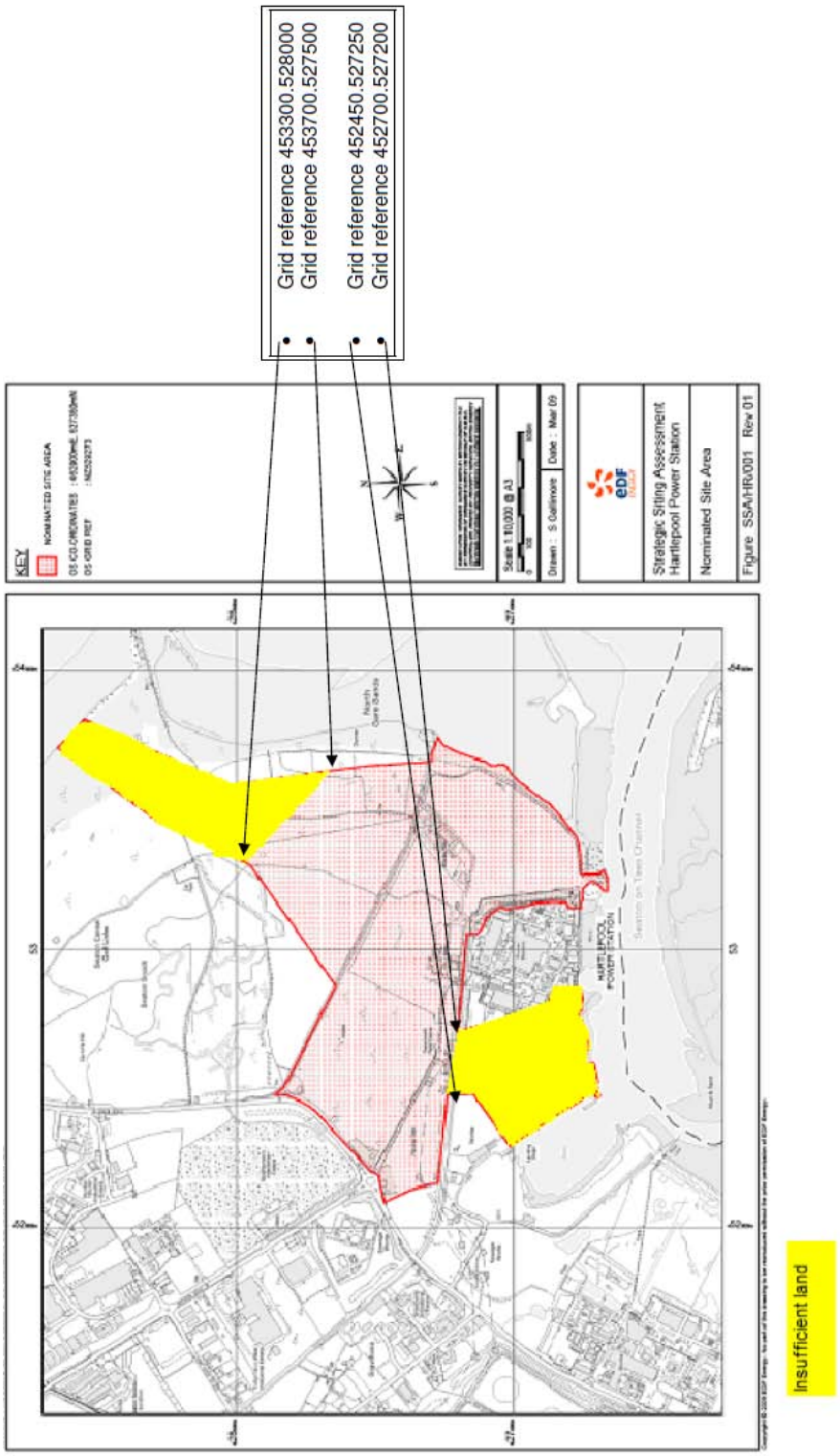
Hartlepool

D3: Proximity to hazardous industrial facilities and operations



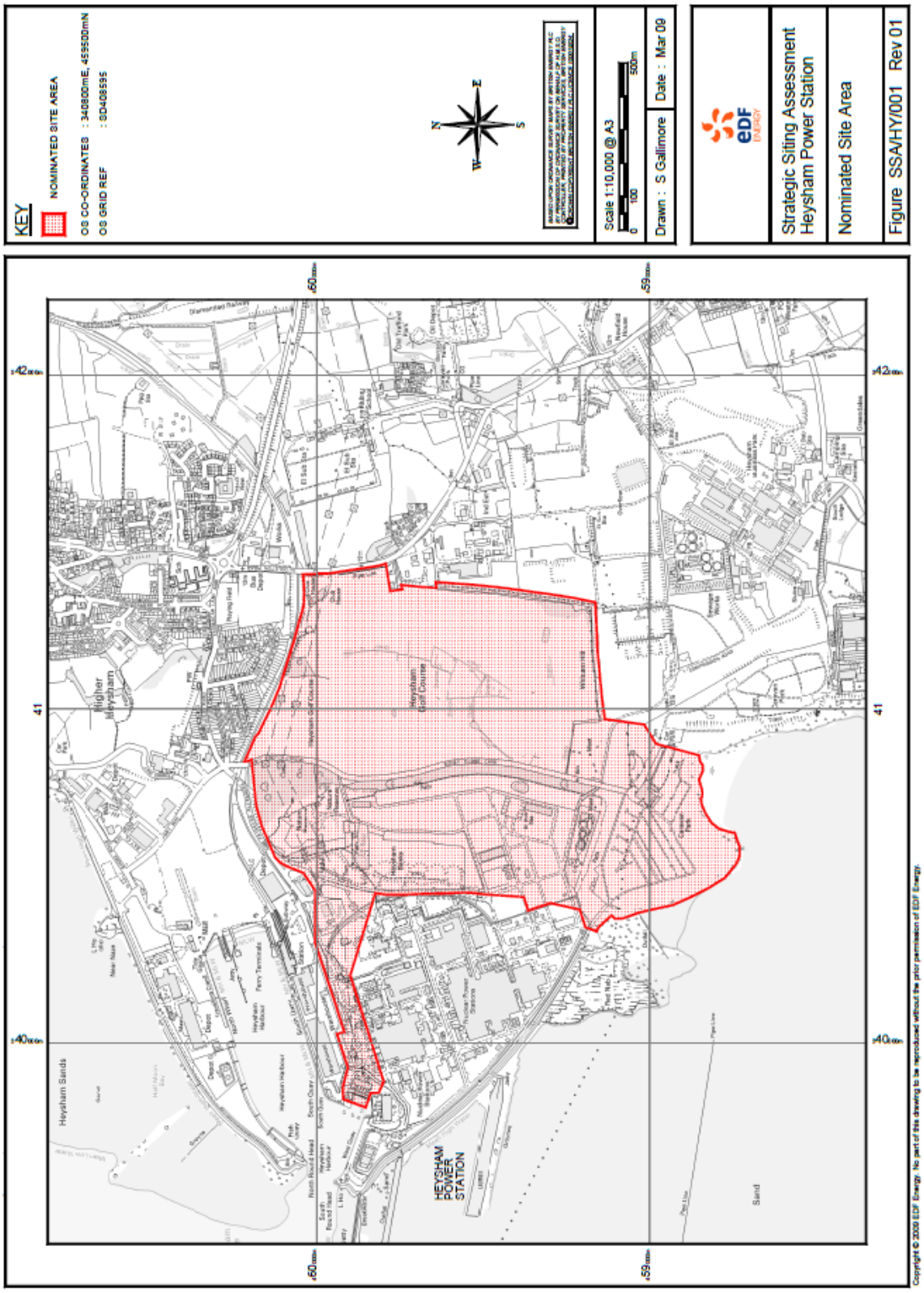
Hartlepool

D9: Size of site to accommodate operation



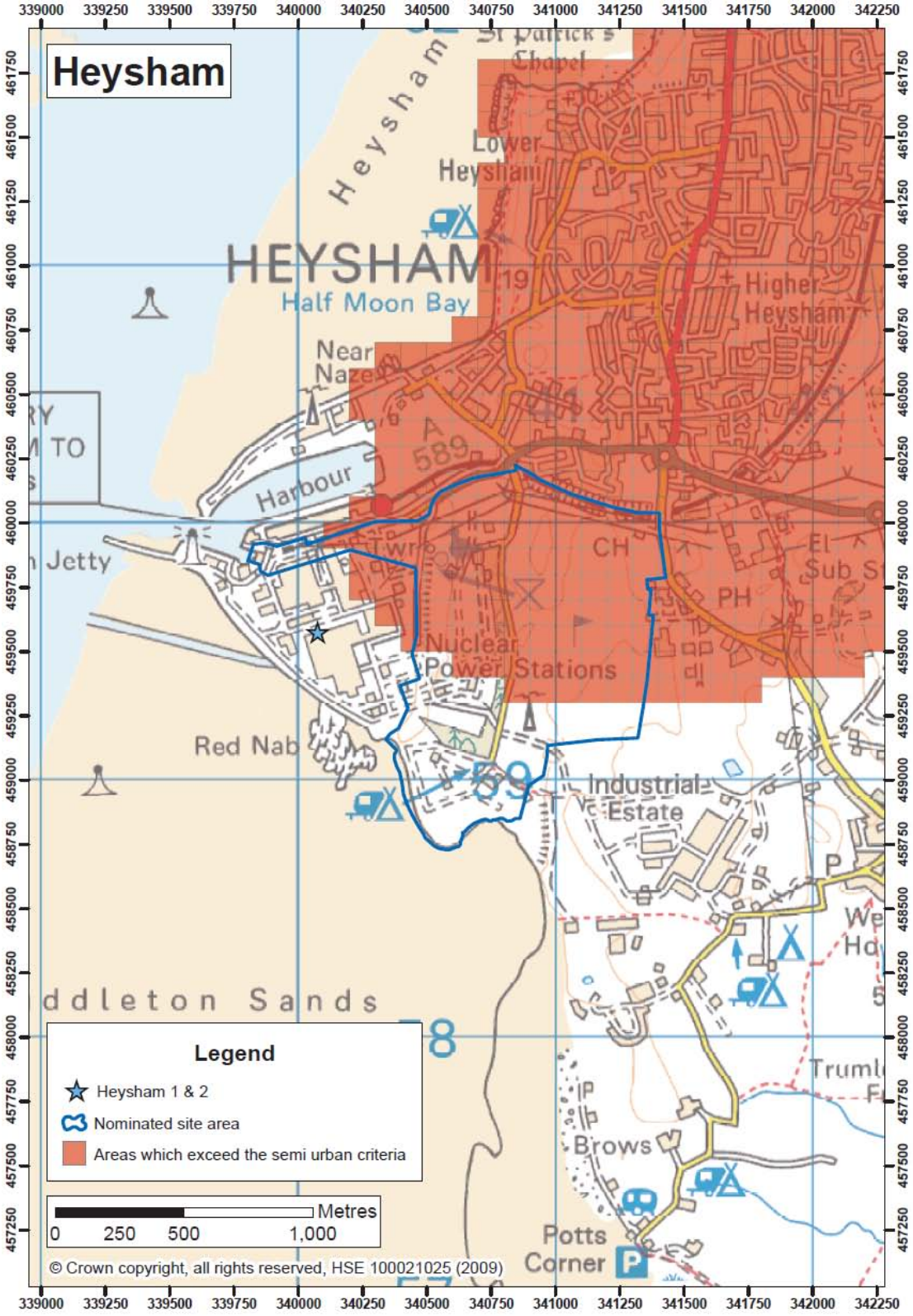
Heysham

Nominator map of site



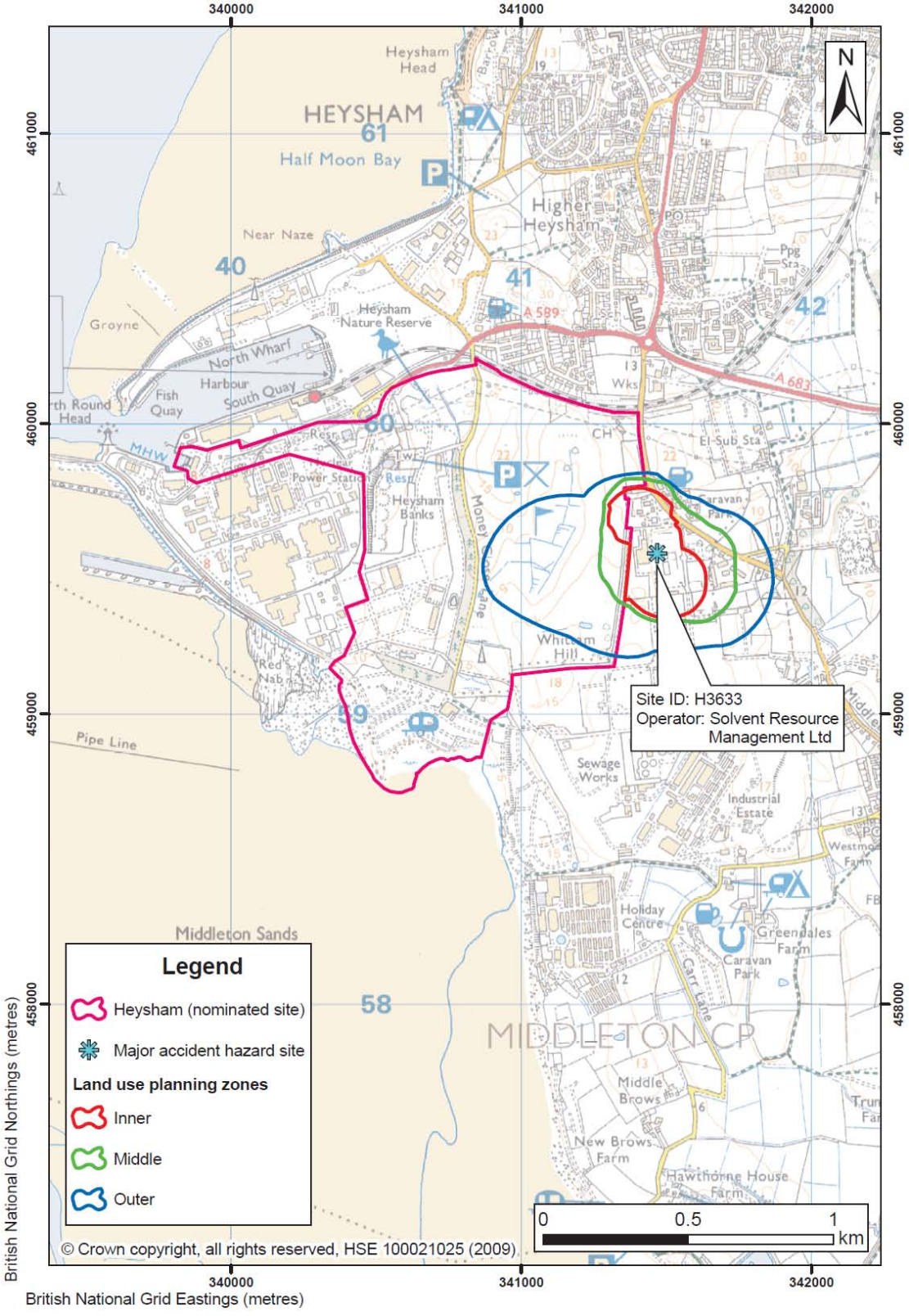
Heysham

C2: Demographics



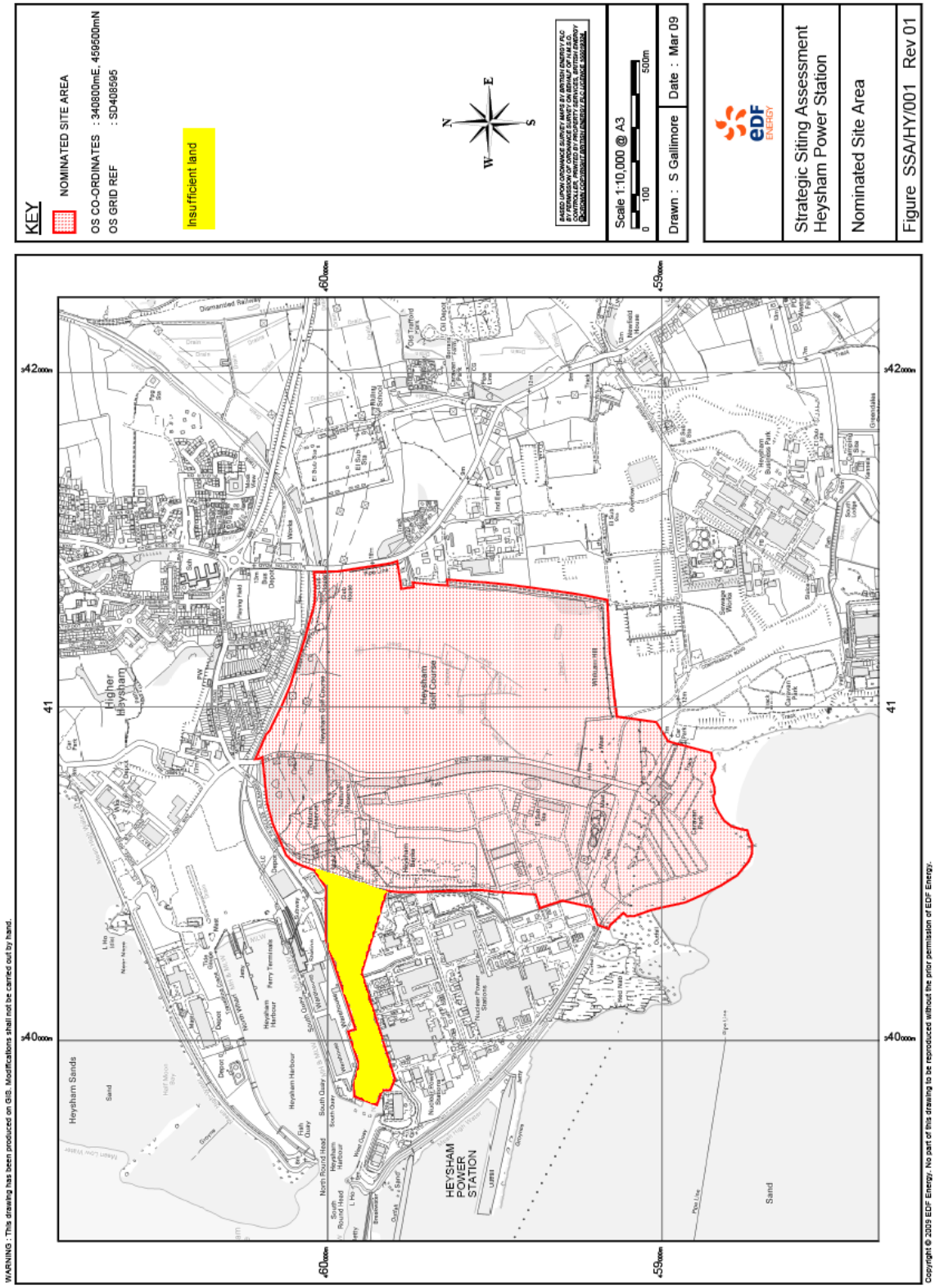
Heysham

D3: Proximity to hazardous industrial facilities and operations



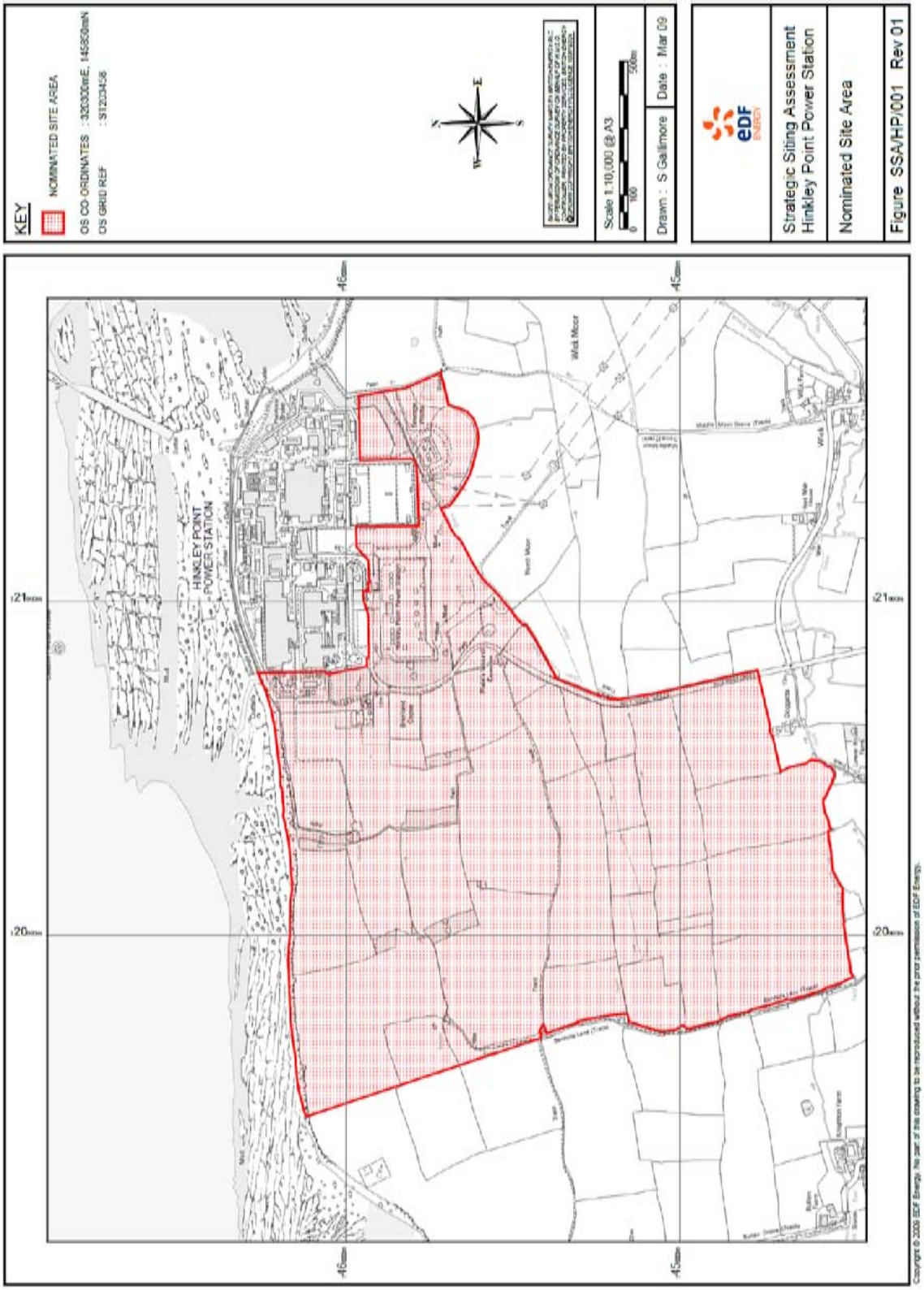
Heysham

D9: Size of site to accommodate operation



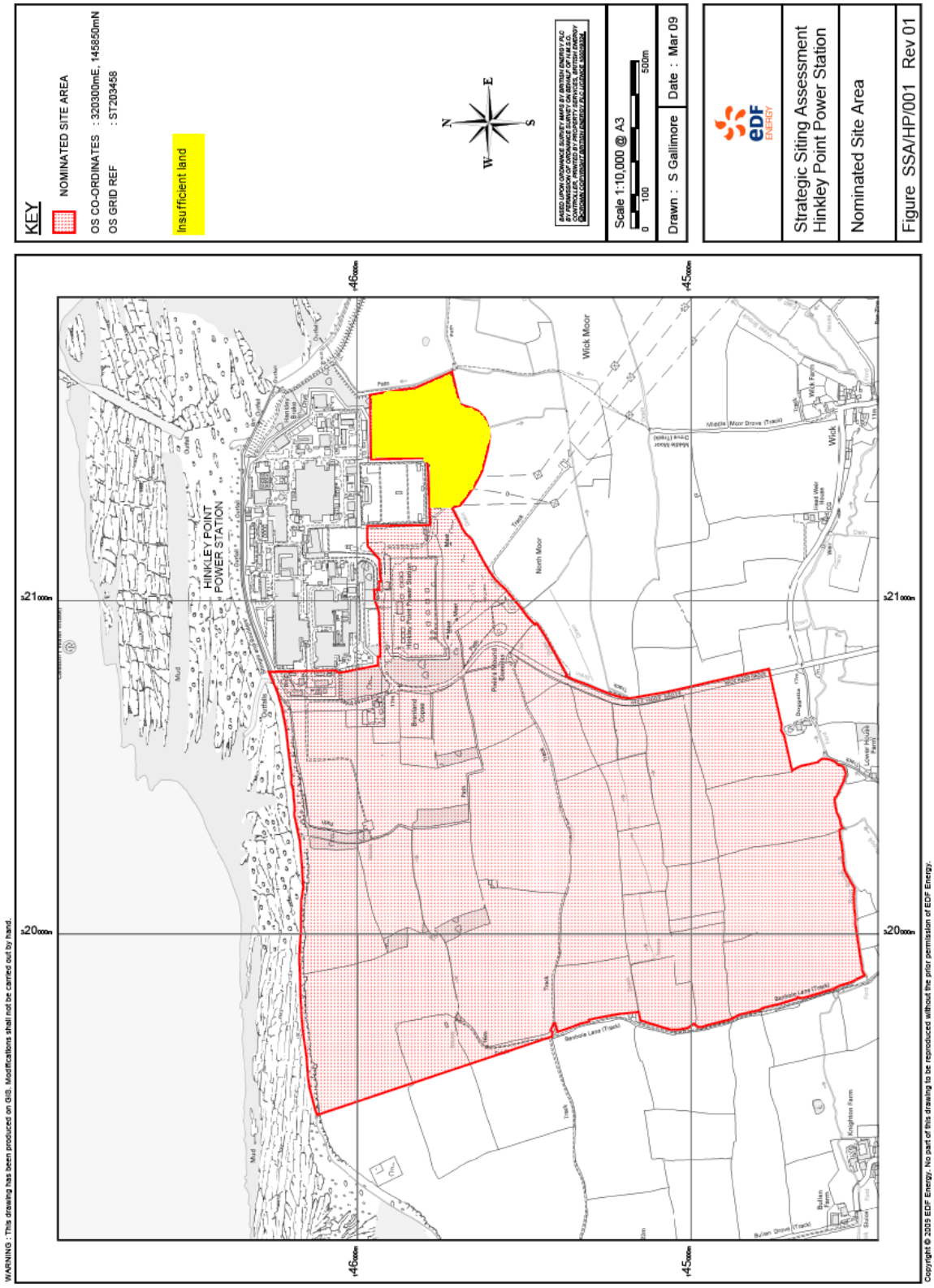
Hinkley Point

Nominator map of site



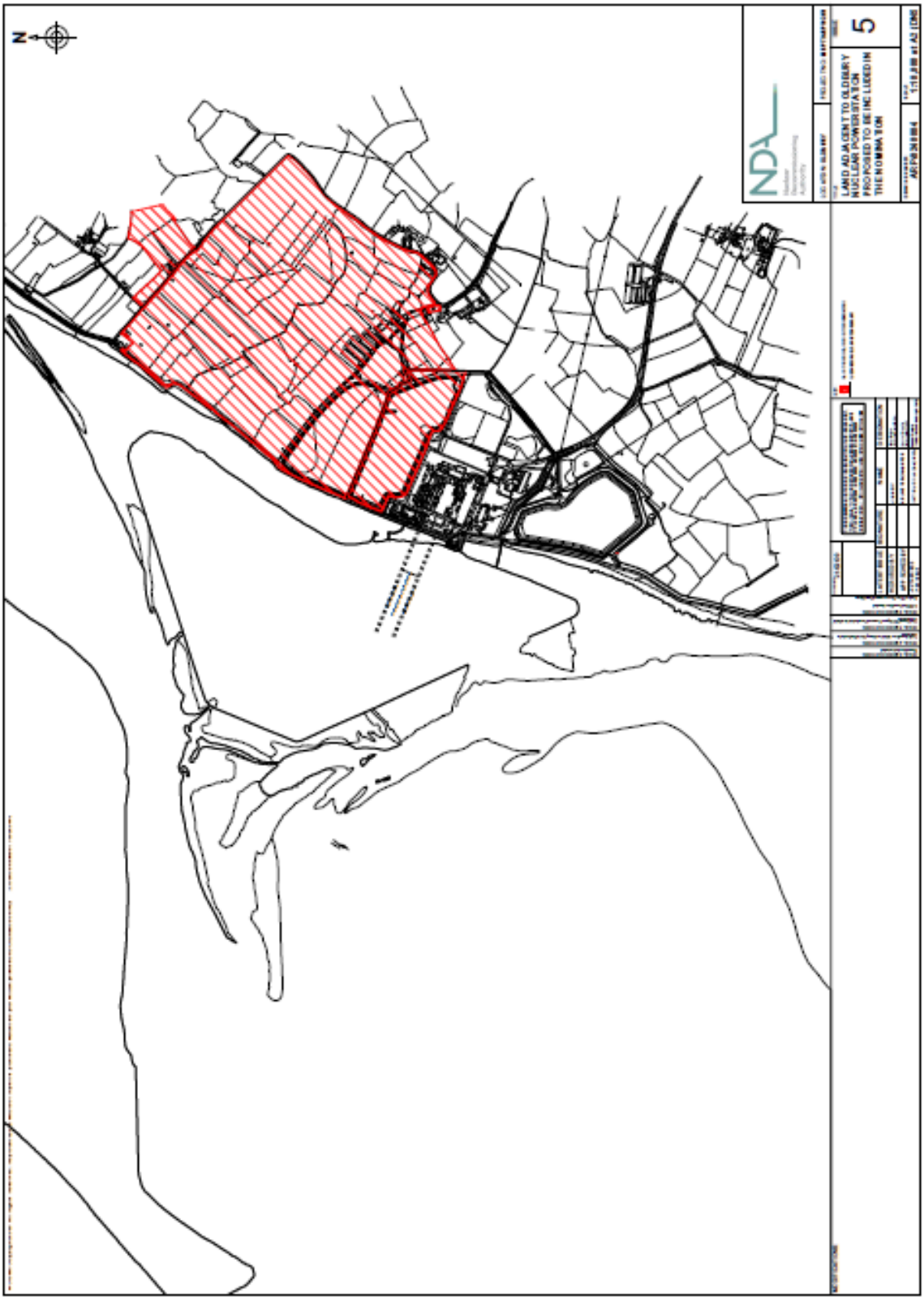
Hinkley Point

D9: Size of site to accommodate operation



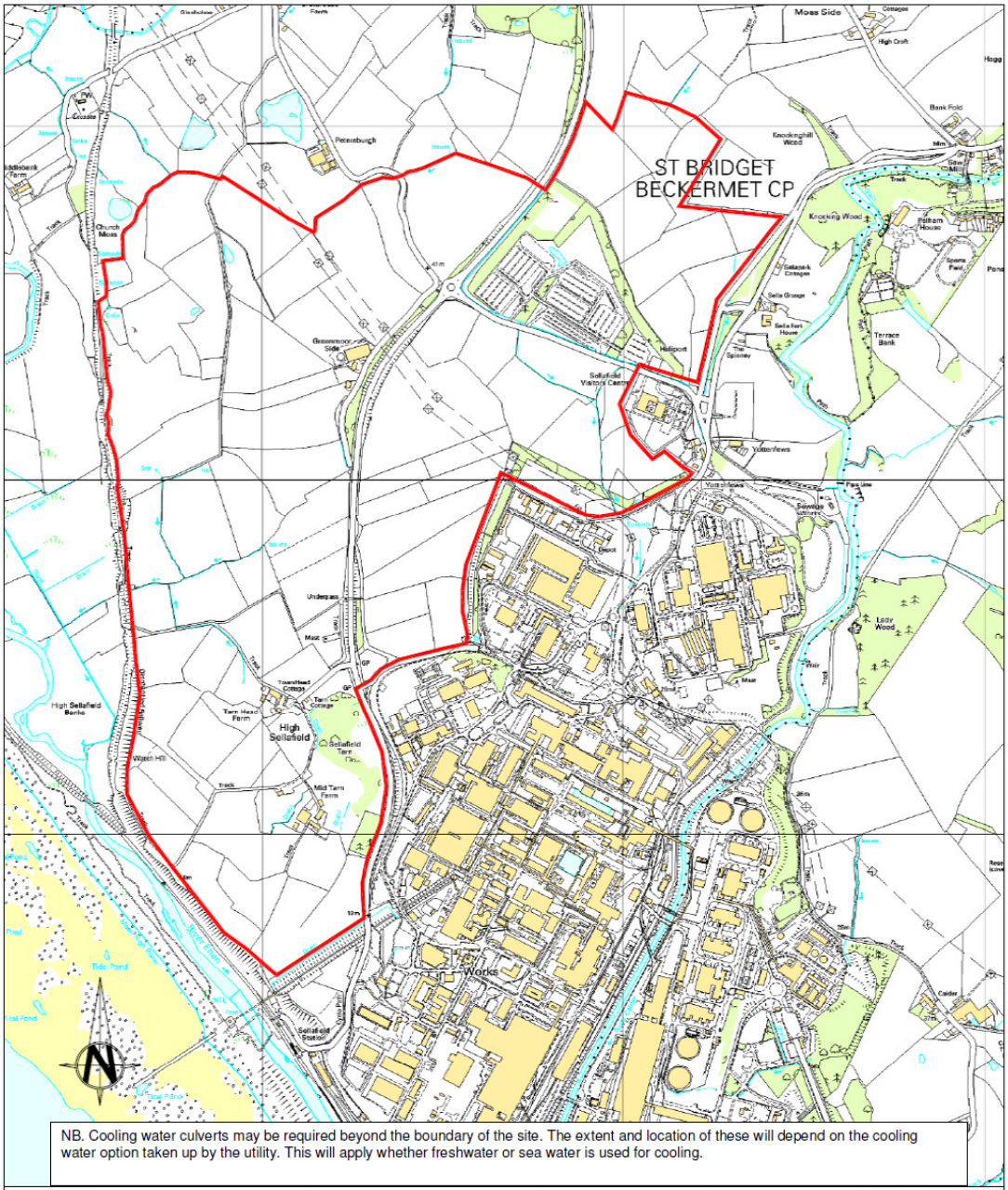
Oldbury

Nominator map of site



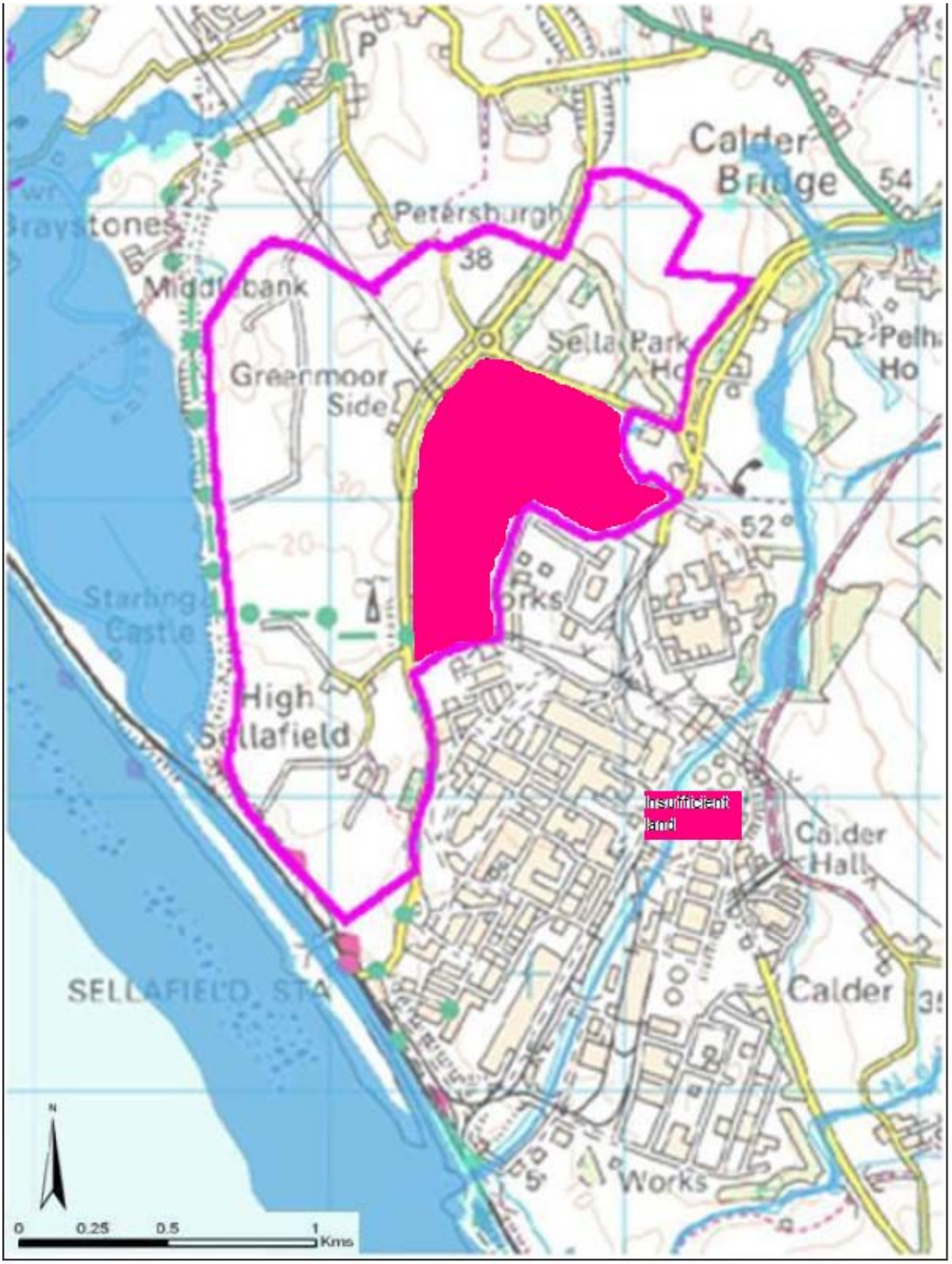
Sellafield

Nominator map of site



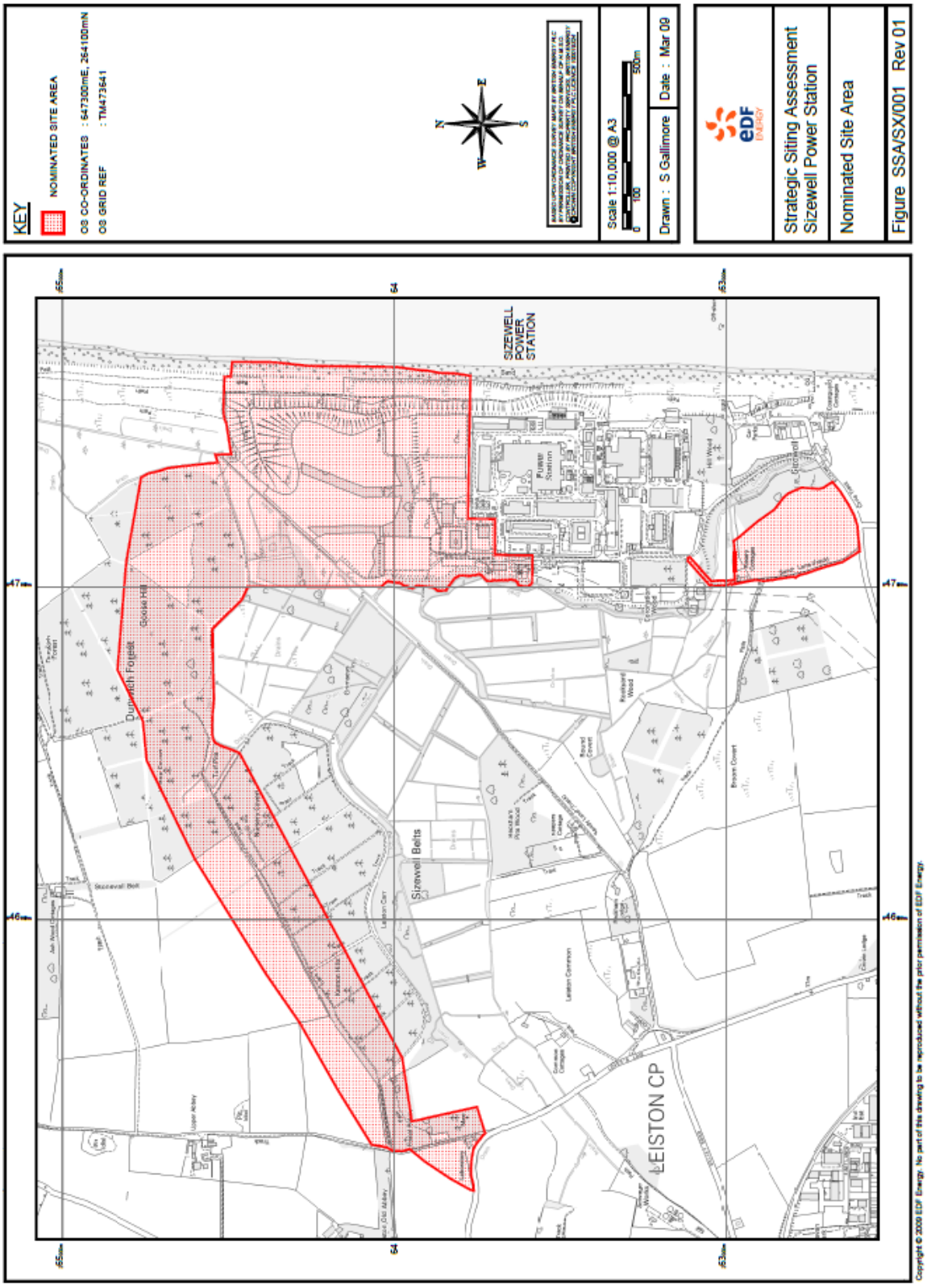
Sellafield

D9: Size of site to accommodate operation



Sizewell

Nominator map of site

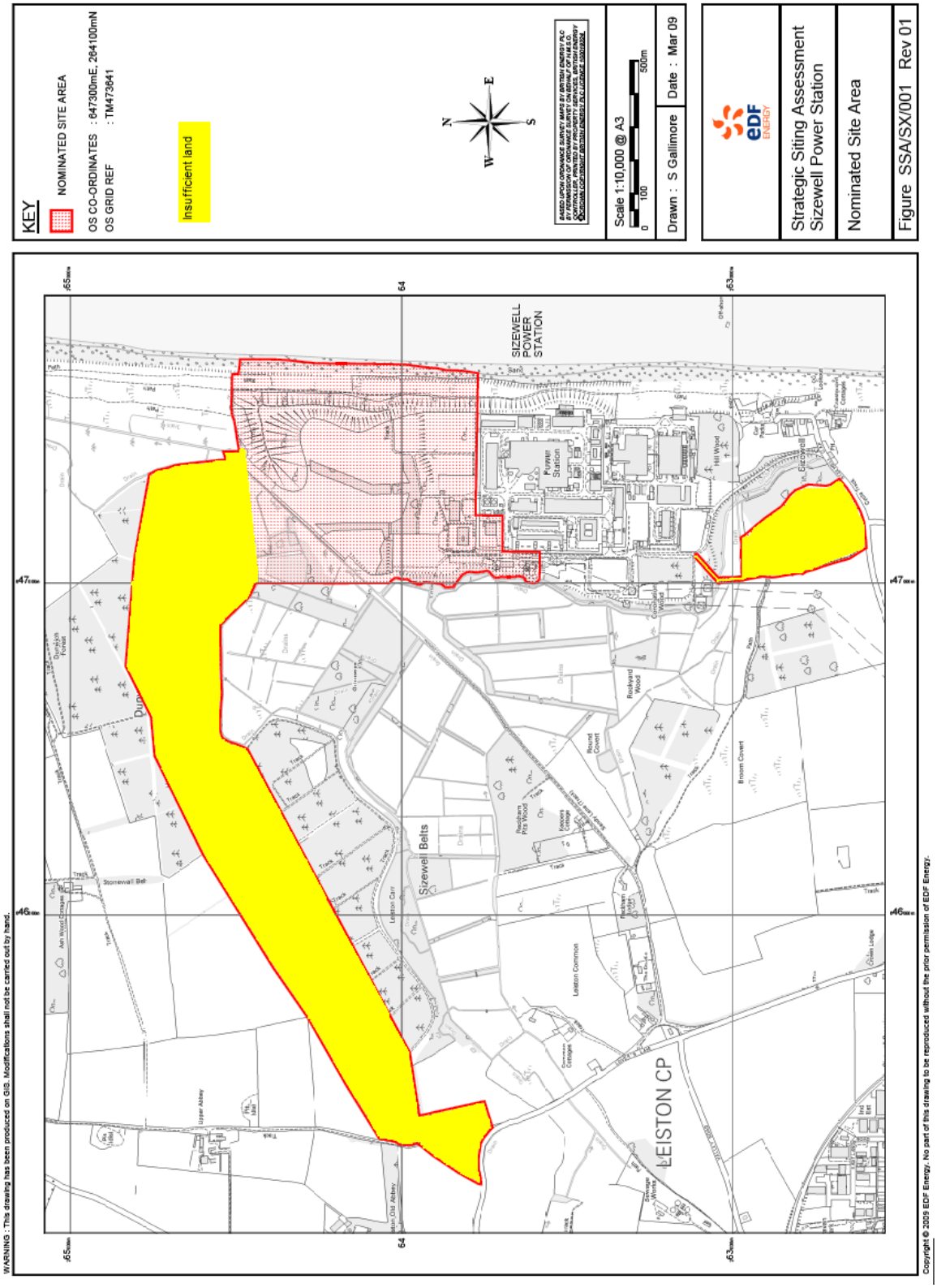


Sizewell

C2: Demographics

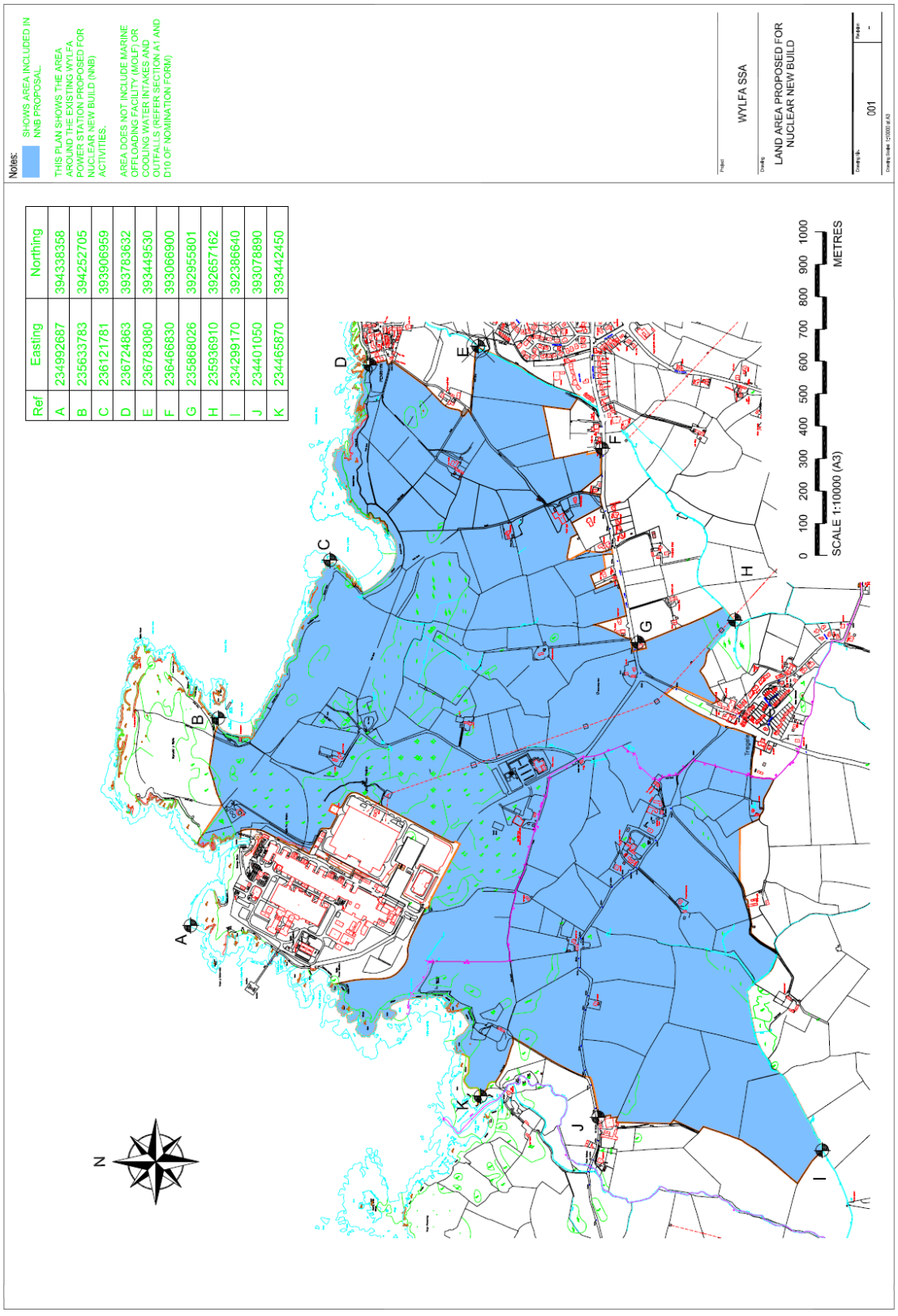
Sizewell

D9: Size of site to accommodate operation



Wylfa

Nominator map of site



The SSA criteria and how sites are assessed

A summary of the SSA criteria which gives background to the criteria and how these were used to assess nominations is set out below. This does not replace the full explanations of the criteria in the Consultation on the SSA Process and Criteria and the Government Response to that consultation[273].

Conditions of nominating

Background

The Government Response to the Consultation on the SSA Process and Criteria set out that the Government would screen nominations against the conditions of nominating. These conditions included consideration of the steps taken to raise awareness of each nomination with local communities, and consideration of the credibility of deployment of one or more new nuclear power stations on the site by the end of 2025.

Raising awareness

The nominator of the site must have demonstrated that they, or where applicable, a third party[274], have taken steps to raise awareness of the nomination with local communities living in the vicinity of the site, including the owner(s) of the nominated sites. The Consultation on the SSA Process and Criteria made a number of suggestions of appropriate ways in which a nominator may do this, without being prescriptive and recognising that different nominators may need to take different approaches. However, as a minimum, nominators should have made the local authority, Regional Development Agency (RDA) and any land owners aware of their nomination, and take steps to publicise the nomination to the wider community through advertisements in local newspapers.

Credibility of deployment by the end of 2025

Although nominations did not have to be made by a credible nuclear power operator (CNPO)[275], the Government had to be satisfied that the site is credible for deployment by the end of 2025, and the Government not being satisfied at this would result in a

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273 BERR, Towards a nuclear national policy statement: Government response to the consultation on the Strategic Siting Assessment process and criteria, January 2009 http://www.berr.gov.uk/files/file47136.pdf URN09/581, and Towards a nuclear national policy statement: Consultation on the Strategic Siting Assessment process and criteria, July 2008, http://www.berr.gov.uk/files/file47136.pdf

274 In some cases public awareness raising and engagement on a nomination may be carried out by third parties, such as potential operators, rather than the nominator themselves.

275 A Credible Nuclear Power Operator (CNPO) is one that currently operates a nuclear power plant anywhere in the world; and currently operates an electricity generating station subject to UK health, safety and environmental regulation, or, that has made a public commitment to become an operator of an electricity generating station (with a capacity in excess of 50MW) by 2016-2025 in a market subject to UK health, safety and environmental regulation.

nomination not being included in the SSA. Nominations had to therefore include either a letter of support from a CNPO (which demonstrated why the CNPO considers the site to be credible for deployment by the end of 2025), or, if there was no letter of support from a CNPO, a statement from the nominator of the site demonstrating that the site is credible for deployment by the end of 2025. Given the importance of early deployment as outlined in Part 2 of this NPS, nominators also explained what prospects there are for deployment earlier within the 2025 timeframe at the site. The Government Response made clear that the letter of support from the CNPO or the nominator's own statement should demonstrate the achievability of timescale for deployment by the end of 2025. It should focus on factors such as constructability, site planning, commissioning and the potential timing of any transmission and distribution infrastructure required to make the site operational and licensing issues. The Government Response also made clear that this was not an exhaustive list and the Government was looking for a statement that demonstrated that the end of 2025 timescale is credible, rather than a detailed project plan which will not normally be needed.

Notes on the assessment

In considering whether the minimum stipulations on raising awareness were met, the relevant RDAs and local authorities were contacted to verify that they had been notified. It was not practicable to contact landowners in the time available so the assessment considered the evidence provided by nominators on this. In considering whether a site is credible for deployment by the end of 2025, the information nominators supplied with regard to whether it is reasonable to construct, plan, commission and connect the site within the necessary timeframe was considered along with any other reasonable factors. This involved the consideration of advice from suitably qualified experts[276] on whether it was reasonable to conclude that a site could be deployed by the end of 2025 from the information given by nominators. The Government has also considered relevant points made during the Spring 2009 opportunity for public comment and the consultation on the draft Nuclear NPS (November 2009 – February 2010).

C1: Demographics

Background

The Government has a longstanding policy regarding local demographics which would limit the radiological consequences to the public in the unlikely event of an accident involving the spread of radioactive materials beyond the site boundary. This policy is a measure of prudence over and above the stringent regulatory requirements imposed on nuclear operators in order to prevent such accidents.

The Office for Nuclear Regulation administers the Government's policy on the control of population around licensed nuclear sites. The Office for Nuclear Regulation fulfils this function throughout the entire life cycle of the installation through consultation with local authorities. This ensures that until the installation is delicensed, the basis for site licensing is preserved through constraints placed on the surrounding population by controls on future development.

276 Atkins Ltd. The advice is published at: http://www.energynpsconsultations.decc.gov.uk

What was assessed?
The Consultation on the SSA Process and Criteria proposed to assess sites against the "semi-urban" demographic criterion and exclude from consideration in the SSA areas where the local population density exceeds the semi-urban criterion. In this assessment where areas of a nominated site exceeded the semi-urban criterion (see Heysham, C1), further advice from the regulators was considered to see whether the site remains viable.

Such flexibility is possible since for licensing the regulators have advised that they would need to be satisfied that only those parts of the power station which contribute a radiological hazard can be located in areas which do not exceed the semi-urban criterion. If the area that exceeded the semi-urban criterion would be required for siting those elements which have a direct potential to cause radiological hazard, the site would be excluded.

Notes on the assessment
Undertaking demographic assessments against the SSA criterion is complex. It would be unreasonable to expect nominators to carry it out themselves; the Health and Safety Executive therefore undertook such assessments for each nominated site[277].

It should be noted that although a site may meet the semi-urban criterion as part of the SSA, this does not guarantee that the demographic features of a site will be acceptable to the Office for Nuclear Regulation following its detailed regulatory assessment at the time of considering a nuclear site licence application[278]. The Government has also considered relevant points made during the Spring 2009 opportunity for public comment and the consultation on the draft Nuclear NPS (November 2009 – February 2010).

C2 and D5: Proximity to military activities (exclusionary and discretionary)

Background
Sites were assessed against these criteria to:

- seek to avoid the external hazards to nuclear power station safety that could be created by neighbouring military activities; and
- ensure that the capabilities of the armed forces to carry out essential training and operations are not adversely affected by the siting of new nuclear power stations.

What was assessed?

277 Guidance on the Office for Nuclear Regulation's approach to demographic assessments is available at: http://www.hse.gov.uk/landuseplanning/nuclear.htm

278 For details of the Office for Nuclear Regulation's implementation of the Government's demographic siting policy and the subsequent control of development around nuclear sites see: http://www.hse.gov.uk/aboutus/meetings/iacs/nusac/030708/p12-sittingpaper.pdf and http://www.hse.gov.uk/landuseplanning/nuclear.htm

Against criterion C2, as set out in the guidance to nominators in the Government Response to consultation[279], sites could be rejected (in whole or in part) if the site is:

- within certain Military Low Flying Tactical Training Areas and Air Weapon Ranges;
- within the air space surrounding a Ministry of Defence aerodrome or an aerodrome used for defence activities contained within a designated Military Air Traffic Zone (MATZ);
- within the air space surrounding a Ministry of Defence aerodrome or an aerodrome used for defence activities contained within a designated Air Traffic Zone (ATZ);
- within or affects the use of the areas used for live firing or other military training activities. These include (but are not limited to) the following areas: Aldershot and Minley Training Area, Hankley and Elstead Commons Training Area, Leek and Upper Hulme Training Area, Longmore Range and Training Area, Otterburn Training Area and Salisbury Plain Training Area;
- within the explosive safeguarding zones surrounding Ministry of Defence explosive storage facilities.

Against criterion D5, it was assessed whether sites are in close proximity to or may affect other Ministry of Defence assets or activities and whether it is reasonable to conclude, at a strategic level, that such proximity should or should not rule out the site for consideration for a new nuclear power station. It was also considered whether there was evidence that impacts could potentially be adequately mitigated without compromising the Ministry of Defence facility or the nuclear installation.

This included consideration of whether any likely nuclear power station development within the nominated site boundary would adversely affect the capabilities of the armed forces to carry out essential training and operations throughout its lifetime and whether it could be protected against the risk of external hazards created by neighbouring military activities. Ministry of Defence assets or activities considered under this criterion included (but were not limited to) technical sites and transmitters, offshore danger areas and nuclear facilities (including ports used by military vessels).

Notes on the assessment

The Ministry of Defence and the Office for Nuclear Regulation provided advice against these criteria. The Government has also considered relevant points made during the Spring 2009 opportunity for public comment and the consultation on the draft Nuclear NPS (November 2009 – February 2010).

D1: Flooding, storm surge and tsunami (discretionary)

Background

The Government response to the Consultation on the SSA Process and Criteria outlined that the SSA process will consider flooding issues from two perspectives. Firstly, the possible threats to the safety of a new nuclear power station in an area exposed to flood

279 BERR, Towards a nuclear national policy statement: Government response to the consultation on the Strategic Siting Assessment process and criteria, January 2009, http://www.berr.gov.uk/files/file47136.pdf URN09/581

risk. Secondly, the wider impacts of flood protection countermeasures on areas surrounding potential new nuclear power station sites.

What was assessed?
The assessment considered whether it is reasonable to conclude, at a strategic level, that a nuclear power station within the nominated site could be protected against flood risks throughout its lifetime, including the potential effects of climate change, storm surge and tsunami, taking into account possible countermeasures and mitigating actions.

Notes on the assessment
For the purposes of this assessment the lifetime of the station includes allowing for the safe and secure storage of all the spent fuel and intermediate level waste produced from operation and decommissioning until it can be sent for final disposal in a geological disposal facility (GDF).

Waste will be stored in safe and secure interim storage facilities until a GDF becomes available. It is currently anticipated that disposal of new build wastes would begin once disposal of legacy wastes is completed. Geological disposal of higher activity waste from new nuclear power stations is currently expected to be available for new build waste from around 2130[280].

In assessing both D1 (flooding) and D2 (coastal processes) the Government has been advised by the Environment Agency and the Office for Nuclear Regulation. Sites were assessed against the climate change allowances in Planning Policy Statement 25 (PPS25)[281] and then UK Climate Projections 2009 (UKCP09)[282] findings. This advice looked at the capacity of nominated sites to withstand flood risk and coastal erosion including the potential effects of climate change using modelling data that looks ahead to 2100. The Office for Nuclear Regulation examined at a strategic level the adaptability of the proposed flood protection mechanism to changes in the demand to give confidence that if the current predictions are revised, modifications to the defences are practicable. This will be examined in more detail as part of the planning and licensing stage.

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280 On the assumption that spent fuel will be stored on-site until it can be disposed of, the key factors in determining the duration of on-site storage are the availability of a geological disposal facility (GDF) and the time required for the spent fuel to cool sufficiently for disposal in a GDF. The Nuclear Decommissioning Authority (NDA's) current indicative timetable anticipates a GDF being available to take spent fuel from new nuclear power stations from around 2130, although the future optimisation of plans for the implementation of geological disposal and the expected inventory for disposal indications may provide potential to bring forward this date. Optimisation work will also explore options for reducing the cooling time required for spent fuel prior to disposal. The Government will expect operators to ensure their waste is disposable when a GDF is anticipated to be available to take the waste. See Section B.4 of this NPS for more detail. An indicative timeline for Geological Disposal can be found at http://www.decc.gov.uk/assets/decc/What%20we%20do/UK%20energy%20supply/Energy%20mix/Nuclear/geological-disposal-board/982-geological-disposal-timeline.pdf

281 *Planning Policy Statement 25: Development and Flood Risk*, December 2006, Annex D pp.22-25, http://www.communities.gov.uk/documents/planningandbuilding/pdf/planningpolicystatement25.pdf

282 http://ukclimateprojections.defra.gov.uk

Given the principles set out in the waste assessment, it is possible that there could be waste on site for longer than the assessment has been able to look ahead. Predictions of potential climate change impacts become less certain the further into the future the assessments are for, and it is not practicable to consider beyond 2100 at this stage. Whilst the assessment has only covered the next hundred years, the regulators are satisfied that additional safeguards are in place to ensure that only suitable sites achieve development and ongoing operational consent.

Firstly, the capacity of new nuclear power stations to withstand the potential impacts of climate change will be reviewed in more detail as part of the site licensing process and as part of the Flood Risk Assessment that applicants must undertake in conjunction with their applications to the IPC.

In addition to meeting the requirements of Section 5.7 of EN-1, applicants should identify the potential effects of the credible maximum scenario in the most recent projections of marine and coastal flooding. Applicants must then be able to demonstrate that they could achieve further measures for flood management at the site in the future, if future climate change predictions show they are necessary.

Any site which was selected for development and subsequent licensing would be required to periodically update these projections as part of the site licence conditions.

Secondly, should sites achieve development consent, their capacity to withstand potential climate change will remain under consideration throughout the life of the nuclear power station. Once licensed, as part of the site licensing conditions, the licensee must review their safety case at regular intervals (typically on a ten year basis). This review will take the most recent climate change projections into account and allow the necessary modifications to flood defences and/or operating arrangements to be undertaken. The objective of the review is to compare the safety case of the site against modern standards to see if there are reasonably practicable improvements that could be made, to demonstrate that the plant is safe to continue to operate, including spent fuel and radioactive waste storage for the next defined period (typically ten years) and to identify any life-limiting factors. Failure to comply with any of the site licensing conditions (including participation in the periodic review) could ultimately result in a direction to undertake activities that would bring the plant into a compliant position. Given these safeguards the Government and regulators believe that it is reasonable to assess sites for potential suitability to 2100.

The site summaries refer to the Flood Zones that nominated sites cover. For a definition of each of the Flood Zones see Planning Policy Statement 25 (PPS25). The assessment also considered the potential wider impact of flood protection countermeasures on areas surrounding the nominated sites.

PPS25 sets out a sequential approach which aims to avoid inappropriate development in

areas at risk of flooding, and to direct development away from areas of highest risk of flooding[283]. The Government has applied the sequential approach in the SSA and concluded that all sites have demonstrated and passed the flood risk sequential test and can be included in this NPS. Further details are in Section 4.2 of this NPS.

As well as the advice of the Office for Nuclear Regulation and the Environment Agency, and the findings of the Appraisal of Sustainability, the Government has also considered relevant points made during the Spring 2009 opportunity for public comment and the consultation on the draft Nuclear NPS (November 2009 – February 2010).

D2: Coastal processes (discretionary)

Background

Low-lying land adjacent to the coastline or an Estuary can be at risk of coastal flooding caused by high tides, storm surges and extreme waves. Coastal processes, such as erosion, also have the potential to pose risks to nuclear power stations over their lifetime although there may sometimes be ways to mitigate such risks.

What was assessed?

The assessment considered whether it was reasonable to conclude, at a strategic level, that a nuclear power station within the nominated site could be protected against coastal erosion and other landscape change scenarios, including the potential effects of climate change, for the lifetime of the station, taking into account possible countermeasures and mitigating actions.

Notes on the assessment

For the purposes of this assessment, the lifetime of the station includes allowing for the safe and secure storage of all the spent fuel and intermediate level waste produced from operation and decommissioning until it can be sent for final disposal in a GDF.

The time that will be required for the safe and secure on-site interim storage of spent fuel and intermediate level waste is contingent on a number of factors. The draft NPS said that it was possible to envisage a scenario in which on-site interim storage of spent fuel might be required for around 160 years from the start of the power station's operation. In light of the responses to the consultation, the Government has reviewed the assumptions which underpinned this scenario and as a result has revised its position. On the assumption that spent fuel will be stored on-site until it can be disposed of, the key factor in determining the duration of on-site storage is the availability of a GDF. The Nuclear Decommissioning Authority's current indicative timetable anticipates a GDF being available to take spent fuel from new nuclear power stations from around 2130. The Government will expect operators to ensure their waste is disposable when a GDF is anticipated to be available to take the waste. The Government recognises that interim storage on-site might be required beyond 2130, particularly in the event that a GDF is not available to take the waste but the

283 See *Planning Policy Statement 25: Development and Flood Risk* (PPS25), July 2001, http://www.communities.gov.uk/publications/planningandbuilding/pps25floodrisk

Government does not expect on-site interim storage to be required for as long as 160 years. Moreover there are some factors which might cause this on-site interim storage period to be significantly shorter, for example it is not necessarily the case that the whole interim storage period for the spent fuel produced by a new nuclear power station will be on-site. However on current assumptions it is considered likely that on-site interim storage of spent fuel might extend beyond 2100.

In assessing both D1 (flooding) and D2 (coastal processes) the Government has been advised by the Environment Agency and the Office for Nuclear Regulation. Sites were assessed against the climate change allowances in Planning Policy Statement 25 (PPS25)[284] and then UK Climate Projections 2009 (UKCP09)[285] findings. This advice looked at the capacity of nominated sites to withstand flood risk and coastal erosion including the potential effects of climate change using modelling data that looks ahead to 2100. This is because predictions of potential climate change impacts become less certain the further into the future the assessments are for and it is not practicable to consider beyond 2100 at this stage. As described under criterion D1, more detailed assessments will be needed for planning and licensing. Any site which was selected for development and subsequent licensing would be required to periodically update projections as part of the site licence conditions.

The assessment was based on the existing knowledge of the Environment Agency of the risk of coastal erosion at sites, of historical coastal events in the region and the most current Shoreline Management Plan policy (in the case of some nominated sites in draft form). For those nominated sites which are adjacent to existing licensed sites, there is also a considerable wealth of information on the prevailing coastal performance and local management arrangements which informed the judgements made. Estimates for the coastal erosion given in the nominations in the vicinity of nominated sites were also considered for their reasonableness.

During the assessment the practicability of the proposed mitigation measures were reviewed along with the implications for areas beyond the immediate site boundary where reliance was placed on defences potentially without the control of the site. Given the safeguards set out against criterion D1, including periodic review, which would equally be applied to consideration of coastal processes, the Government and regulators believe that it is possible to assess sites for potential suitability to 2100.

Advice was received from the Environment Agency, supported by the Office for Nuclear Regulation, in reviewing the nomination against this criterion. The Government also considered the findings of the Appraisal of Sustainability and Habitats Regulations Assessment where appropriate, and relevant points made during the Spring 2009 opportunity for public comment and the consultation on the draft Nuclear NPS (November 2009 – February 2010)

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284 *Planning Policy Statement 25: Development and Flood Risk*, December 2006, Annex D p22-25,http://www.communities.gov.uk/documents/planningandbuilding/pdf/planningpolicystatement25.pdf

285 http://ukclimateprojections.defra.gov.uk

D3: Proximity to hazardous facilities (discretionary)

Background
The safety regulation of nuclear power stations requires that the risks posed by external hazards are minimised. These considerations extend beyond the natural hazard issues described above to include a requirement to consider the man-made external hazards to the nuclear power station's safety.

What was assessed?
The assessment considered whether it was reasonable to conclude that a new nuclear power station at the nominated site could be protected against potential risk arising from proximity to hazardous facilities throughout its lifetime taking into account suitable counter measures and mitigating actions. The Government Response to the Consultation on the SSA Process and Criteria set out that a nominated site may be unsuitable, on a discretionary basis, if it is within the consultation distance of an existing or proposed hazardous facility.

Notes on the assessment
Given the security considerations around the information for this criterion, nominators were not required to provide information themselves although many nominators did. The Office for Nuclear Regulation provided advice in assessing nominations against this criterion. With regard to establishments subject to the Control of Major Accidents and Hazards (COMAH) Regulations 1999 (which is determined by chemical type and inventory), the Health and Safety Executive has developed a methodology for assessing development near to such sites – the Planning Advice for Developments near Hazardous Installations (PADHI) system[286]. This gives guidance to planning authorities in considering the suitability of domestic, institutional and industrial developments within a series of zones (inner, middle and outer, the latter forming a Consultation Distance around hazardous installations).

Some sites on the PADHI database may be subject to the Hazardous Substances Consent Regulations[287] but not to COMAH. The Health and Safety Executive also considered all sites which qualify for Hazardous Substances Consent for which the Health and Safety Executive produce planning consultation zones.

The Government has also considered relevant points made during the Spring 2009 opportunity for public comment and the consultation on the draft Nuclear NPS (November 2009 – February 2010).

D4: Proximity to civil aircraft movements (discretionary)

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286 For more detail on the PADHI system, see BERR, *Towards a nuclear national policy statement: Consultation on the Strategic Siting Assessment process and criteria*, July 2008, pp 52 – 53,http://www.berr.gov.uk/files/file47136.pdf

287 Planning Hazardous Substances Act 1990 and the Planning (Hazardous Substances) Regulations 1992 as amended by the planning (Control of Major Accident Hazards) Regulations 1999.

Background
The Consultation on the SSA Process and Criteria set out that there is a risk to all nuclear facilities (as there is everywhere), related to an aircraft crashing on or near to the site. Large aircraft crashes are a rare event in the UK, however, the risk across the country is not uniform. The mitigating actions to protect new nuclear power stations can also have an impact on civil aircraft movements. See the consultation document for a detailed description of this criterion.

What was assessed?
The assessment considered whether it is reasonable to conclude that:

- any likely nuclear power station development within the nominated site boundary can be protected against risks from civil aircraft movement[288]; and
- the effects on air traffic and aerodromes can potentially be mitigated.

Notes on the assessment
The Civil Aviation Authority and Office for Nuclear Regulation provided advice in considering this criterion. Unlicensed aerodromes that have not lodged aerodrome safeguarding plans have not been assessed as part of the SSA, but would need to be considered under the assessment set out in Section 5.4 of EN-1 should any application for development consent come forward. The Government has also considered relevant points made during the Spring 2009 opportunity for public comment and the consultation on the draft Nuclear NPS (November 2009 – February 2010).

D6: Internationally designated sites of ecological importance (discretionary)

Background
There are numerous ecological sites across the UK that are protected from the impacts of development by international and European legislation and agreements. The Consultation on the SSA Process and Criteria set out that the SSA will, through the application of criterion D6, seek to ensure that developers minimise the adverse impact of new nuclear power stations on the UK's most environmentally sensitive features[289].

What was assessed?
Habitats Regulations Assessment and Appraisal of Sustainability reports on each nominated site were considered to assess whether European Sites (defined below) would be directly or indirectly affected by the deployment of a new nuclear power station on the site; the likely level of impact and whether it was reasonable to conclude, at a strategic level, that the plan would not have an adverse effect on the integrity of such sites (including

288 This may involve a consideration of the application of the Air Navigation (Restriction of Flying) (Nuclear Installations) Regulations 2007 to the nominated site.

289 BERR, *Towards a nuclear national policy statement: Consultation on the Strategic Siting Assessment process and criteria*, p64, http://www.berr.gov.uk/files/file47136.pdf

a consideration of whether it should be possible to avoid or mitigate any effects) in line with the standards set by the Habitats Directive. The statutory consultees[290] were consulted on these reports and their advice informed the assessment.

Where it was not possible to rule out an adverse effect on the integrity of sites protected under the Habitats Directive, the assessment considered whether there were alternative solutions and subsequently Imperative Reasons of Overriding Public Interest (IROPI) in favour of including those sites in this NPS in accordance with article 6(4) of the Habitats Directive. The Government's consideration of IROPI is set out in Annex A of this NPS. The Government was also required to consider the issue of compensatory measures under article 6(4) of the Habitats Directive.

Notes on the assessment

The Habitats Directive protects habitats and species of European nature conservation importance by establishing a network of internationally important sites designated for their ecological status[291]. These are referred to as Natura 2000 sites or European Sites, and comprise of Special Protection Areas[292] (SPAs), Special Areas of Conservation (SACs), candidate Special Areas of Conservation (cSAC), and Sites of Community Importance (SCIs) designated and defined under the Habitats Directive. It is Government policy to treat Ramsar sites, designated by the Ramsar Convention on Wetlands (1971) and potential SPAs, pSPAs) as if they are fully designated European Sites for the purpose of considering any development proposals that may affect them[293]. The Government has also considered relevant points made during the Spring 2009 opportunity for public comment and the consultation on the draft Nuclear NPS (November 2009 – February 2010).

D7: Nationally designated sites of ecological importance (discretionary)

Background

In line with criterion D6, the Consultation on the SSA Process and Criteria also set out that the intention to use the SSA to help to minimise the adverse impacts of development on nationally designated sites of ecological sensitivity, including:

- Sites of Special Scientific Interest (England, Scotland and Wales) and Areas of Special Scientific Interest (Northern Ireland), some of which are also Natura 2000 or Ramsar sites and are therefore covered by criterion D6;

290 Environment Agency, Environment Agency Wales, English Heritage, Natural England, Department of the Environment, Northern Ireland, Cadw, Countryside Council for Wales, Scottish Natural Heritage, Scottish Environment Protection Agency, Historic Scotland.

291 The European Directive (92/43/EEC) on the Conservation of Natural Habitats and Wild Flora and Fauna.

292 Classified under the EC Birds Directive 1979 (codified as amended in the European Directive 2009/147/EC).

293 ODPM, Planning Policy Statement 9 Biodiversity and Geological Conservation; Government Circular: Biodiversity & Geological Conservation – Statutory Obligations and their impact within the planning system (ODPM, 2005); WAG, Technical Advice Note (TAN) 5 Nature Conservation and Planning (2009).

- National Nature Reserves;
- Marine Nature Reserves;
- Marine Conservation Zones;
- Areas of Special Protection (England, Scotland and Wales) and Wildlife Refuges (Northern Ireland);
- Natural Heritage Areas (in Scotland);
- Limestone Pavement Orders

What was assessed?
The potential impact of deployment of a new nuclear power station on nationally designated sites of ecological importance, the likely level of impact and whether it is reasonable to conclude, at a strategic level, that it may be possible to avoid or mitigate such impact was considered.

Notes on the assessment
Nominations were assessed using in particular the Appraisal of Sustainability reports in considering this criterion. The fact that it has not been possible to conclude that there will be no adverse impacts has not necessarily resulted in a site being considered unsuitable. In conducting the assessment, the Government has, where possible, taken account of the likely level of any impact. Where appropriate, it has also taken account of the extent of the need for new generating capacity. The Government has also taken account of the fact that this is a strategic level study and that it will not always be possible to rule out adverse impacts at a strategic level.

Where a development of a nominated site was likely to affect a Site of Special Scientific Interest (SSSI), the Government has, where possible, tried to further the conservation and enhancement of the flora, fauna or geological or physiographical features by reason of which the site is of special scientific interest. The Government has done this by considering these matters through the Appraisal of Sustainability at a strategic level and by ensuring that those matters will receive further consideration through the Guidance to the IPC in Part 4 of EN-1. The statutory consultees[294] were consulted on these reports and their advice informed the assessment. The Government has also considered relevant points made during the Spring 2009 opportunity for public comment and the consultation on the draft Nuclear NPS (November 2009 – February 2010).

D8: Areas of amenity, cultural heritage and landscape value (discretionary)

Background
The UK's planning system seeks to protect, where possible, sites and structures of specific amenity, cultural heritage and landscape value. For the purposes of the SSA these sites included:

- Unesco World Heritage Sites;

294 Environment Agency, Environment Agency Wales, English Heritage, Natural England, Department of the Environment, Northern Ireland, Cadw, Countryside Council for Wales, Scottish Natural Heritage, Scottish Environment Protection Agency, Historic Scotland.

- Scheduled Monuments;
- Protected Wreck Sites;
- National Parks;
- Areas of Outstanding Natural Beauty (England, Wales and Northern Ireland);
- National Scenic Areas (Scotland);
- Listed buildings;
- Conservation Areas; and
- Areas of Archaeological Importance.

What was assessed?
The nomination was considered in conjunction with the Appraisal of Sustainability reports to consider whether there was an impact on nationally designated sites, the likely level of impact and whether it was reasonable to conclude, at a strategic level, that it should be possible to avoid or mitigate such impact.

Where it is considered that the development of a site is likely to affect a National Park, the Government has had regard to the purposes of the designation of the National Park in conserving and enhancing the natural beauty, wildlife and cultural heritage of the park and promoting opportunities for the understanding and enjoyment of the special qualities of those areas by the public. Where it is considered that the development of a site is likely to affect an Area of Outstanding National Beauty (AONB), the Government has had regard to the purpose of conserving and enhancing the natural beauty of the area of outstanding natural beauty.

The fact that it has not been possible to conclude that there will be no adverse impacts has not necessarily resulted in a site being considered unsuitable. In conducting the assessment, the Government has, where possible, taken account of the likely level of any impact. Where appropriate, it has also taken account of the extent of the need for new generating capacity. The Government has also taken account of the fact that this is a strategic level study and that it will not always be possible to rule out adverse impacts at a strategic level.

Notes on the assessment
Nominations were considered using, in particular, the Appraisal of Sustainability reports. The statutory consultees[295] were consulted on these reports and their advice informed the assessment. The Government has also considered relevant points made during the Spring 2009 opportunity for public comment and the consultation on the draft Nuclear NPS (November 2009 – February 2010).

D9: Size of site to accommodate operation (discretionary)

Background

295 Environment Agency, Environment Agency Wales, English Heritage, Natural England, Department of the Environment, Northern Ireland, Cadw, Countryside Council for Wales, Scottish Natural Heritage, Scottish Environment Protection Agency, Historic Scotland.

Sites will have to be large enough to safely accommodate the operation of modern nuclear power stations. The availability of land is also of particular relevance in the context of security arrangements required for nuclear power station sites. Operators are required to adopt the concept of "defence-in-depth" in protecting nuclear power stations[296]. This will require them to make adequate land available so that effective control over activities and access may be exercised on and around each nuclear power station.

What was assessed?

As set out in the Government Response to the Consultation on the SSA Criteria and Process[297], the assessment considered whether it was reasonable to conclude that there was enough land within the boundary nominated to safely and securely operate at least one new nuclear power station. This took consideration of whether the area nominated includes a provision for the safe and secure storage of all the spent fuel and intermediate level waste produced through operation, and from decommissioning, on the site of the station until it can be sent for disposal in a GDF. The assessment also included whether there is adequate land available so that effective control over activities and access may be exercised on and around a new nuclear power station on the nominated site.

Notes on the assessment

Operators were expected to factor this into the area nominated. The Government expects nominators of new nuclear power stations to make provision for safe and secure storage of all the spent fuel and intermediate level waste produced through operation and from decommissioning on the site of the station for several decades until it can be sent for disposal in a GDF. Operators were expected to factor the need for this into the area nominated.

At this stage, nominators will not have detailed plans for construction or decommissioning and will therefore not know what land, beyond that required for operations, they will need for these activities. These elements will form part of the application for development consent to be assessed by the IPC. Nominators were, however, encouraged to ensure that the area nominated included all likely site plans and all reasonable variations to those plans. It is therefore possible that the nominated area will be larger than the actual site plan that will be put forward, in due course, for development consent.

The has confirmed that a rectangular area of adequate width (approximately 30 hectares) is required to provide the effective defence-in-depth necessary for the reactor building, spent fuel and intermediate level waste stores. Nominators have indicated that in their view the size of site required for the operation of a permanent site of a single nuclear power unit allowing for operation, maintenance, storage
of spent fuel and intermediate level waste would be between 30 to 50 hectares. The Office

296 Defence-in-depth is defined by the International Atomic Energy Agency (IAEA) as "a concept used to design security systems that require an adversary to overcome or circumvent multiple obstacles, either similar or diverse, in order to achieve his objective".

297 BERR, *Towards a nuclear national policy statement: Government response to the consultation on the Strategic Siting Assessment process and criteria*, January 2009, p.46, http://www.berr.gov.uk/files/file47136.pdf

for Nuclear Regulation concur with this estimate. The most recent nuclear power station to be developed in the UK (Sizewell B) has a total site area of 26 hectares for operational facilities including spent fuel and waste storage.

The Office for Nuclear Regulation and the Office for Civil Nuclear Security provided advice against this criterion. This advice involved consideration of both the size and the shape of the area, given that shape is particularly relevant in considering whether there is sufficient room for defence-in-depth of elements of the facility. The Government has also considered relevant points made during the Spring 2009 opportunity for public comment and the consultation on the draft Nuclear NPS (November 2009 – February 2010).

D10: Access to suitable sources of cooling (discretionary)

Background

Nuclear power stations require suitable cooling for safe and efficient operation. Feasible options for cooling include:

- direct use of sea, lake or river water without cooling towers;
- use of cooling towers, typically combined with lake or river sites and using considerably less water than direct cooling; and
- air-based cooling, with minimal water requirements but utilising large heat exchangers.

The environmental impacts of cooling depend largely on the environmental sensitivity of the area, the cooling requirements of the nuclear power station and the detailed design of the cooling system. Both abstraction and discharge of cooling water can affect the environment. Cooling towers can also have visual impact.

What was assessed?

The assessment considered whether it is reasonable to conclude that there are suitable sources of cooling for a new nuclear power station at the nominated site, taking account of potential measures to counter impacts, and mitigating actions.

Notes on the assessment

Nominators were expected to offer information about cooling technologies that are feasible for likely nuclear power station developments within the nominated site. They were not expected to specify particular reactor designs or the number of reactors to be developed on the nominated site.

This criterion was considered in conjunction with advice from the Office for Nuclear Regulation and the Environment Agency. The findings of the Appraisal of Sustainability were also considered as it appraised both the biodiversity and visual impacts of potential cooling technologies. The Government has also considered relevant points made during the Spring 2009 opportunity for public comment and the consultation on the draft Nuclear NPS (November 2009 – February 2010).

ANNEX D: Glossary of key terms used in this NPS[298]

AoS	Appraisal of Sustainability
Alternative Sites Study	A strategic level screening exercise commissioned by the Government to identify all sites in England and Wales that are potentially suitable for the deployment of new nuclear power stations by the end of 2025 that had not been nominated as part of the SSA
AP-1000	A new nuclear reactor designed by Westinghouse that is being assessed as part of GDA
CLG	Department for Communities and Local Government
deployment	Commencing operation of one or more new nuclear power stations
DECC	Department of Energy and Climate Change
DfT	Department for Transport
EA	Environment Agency
EIA	Environmental Impact Assessment
EN-1	Overarching NPS for Energy
EN-5	The NPS for Electricity Networks Infrastructure
EN-6	The NPS for Nuclear Power Generation (or the Nuclear NPS)
energy NPSs	The suite of six energy NPSs produced by DECC (EN-1 to EN-6)
energy NSIPs	Nationally significant energy infrastructure projects, applications for which will be considered by the IPC in accordance with the energy NPSs
EPR	European Pressurised Reactor - a new nuclear reactor designed by Areva that is being assessed as part of GDA
European Sites	A network of internationally important sites designated for their ecological status, comprising Sites of Community Importance (SCI), Special Protection Areas (SPAs), Special Areas of Conservation (SACs), candidate Special Areas of Conservation (cSACs) and European Offshore Marine Sites (EOMS). For the purposes of EN-6 this term also includes Ramsar sites and potential SPAs
Flags for Local Consideration	Siting criteria that were identified through the SSA process, but which were considered would be more appropriately assessed at the project level

298 This glossary sets out the most frequently used terms in this NPS. There is a similar list in each of the energy NPSs. The glossary set out in EN-1 will also be useful when reading this NPS.

GDA	Generic Design Assessment
generic impacts	Potential impacts of any energy NSIPs, the general policy for consideration of which is set out in Part 5 of EN-1
Habitats Directive	The European Directive (92/43/EEC) on the Conservation of Natural Habitats and Wild Flora and Fauna
HSE	Health and Safety Executive. The Office for Civil Nuclear security, along with the Nuclear Installations Inspectorate, were part of the Nuclear Directorate within the Health and Safety Executive (HSE). The Nuclear Directorate was replaced by the Office for Nuclear Regulation (ONR), an agency of the Health and Safety Executive, on 1st April 2011. The Government intends to bring forward legislation to bring the ONR outside of the HSE in due course.
HRA	Habitats Regulations Assessment
IPC	Infrastructure Planning Commission
IROPI	Imperative Reasons of Overriding Public Interest (see Annex A of this NPS)
MW	Megawatts
NDA	Nuclear Decommissioning Authority
NPS	National Policy Statement
Nuclear AoS	The AoS for EN-6
Nuclear Impacts	Potential impacts of new nuclear power stations where additional policy is provided in Part 3 of EN-6 in addition to that set out in EN-1
Nuclear HRA	The HRA for EN-6
Nuclear Regulators	The EA, the ONR, and DfT (see below).
OCNS ONR NII	The Nuclear Installations Inspectorate (NII) and the Office for Civil Nuclear Security (OCNS) were part of the Nuclear Directorate within the HSE. The NII was replaced by the ONR, an agency of the Health and Safety Executive, on 1st April 2011. The Government intends to bring forward legislation to bring the ONR outside of the HSE in due course.
SSA	Strategic Siting Assessment

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