Permitting new nuclear power stations

Environmental permitting of NNB Generation Company (Sizewell C) Limited

Decision document: Combustion activity

March 2023

Version 2

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Published by:

Environment Agency
Horizon House, Deanery Road,
Bristol BS1 5AH

www.gov.uk/environment-agency

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Contents

Executive summary

This document sets out our final decision on the application NNB Generation Company (SZC) (afterwards referred to as NNB GenCo (SZC) Limited made for an environmental permit). The application was made under the Environmental Permitting (England and Wales) Regulations 2016 (EPR 2016) to carry out combustion activities associated with the operation of a new nuclear power station at the Sizewell C site, near Leiston, in Suffolk.

We advertised and consulted the public and other stakeholders on our proposed decision on the application between 4 July and 25 September 2022. We also advertised the application and consulted the public and other stakeholders on it between 6 July and 2 October 2020. We have assessed the application, considered the responses we received from both consultations, and have made a final decision to grant the application subject to the conditions in the permit that accompanies this document.

The proposed nuclear power station has 2 pressurised water reactors based on EDF and AREVA's UK EPR™ design (EPR™). The total expected net electrical capacity is 3,260MW.

The site-specific application NNB Generation Company (SZC) Limited made builds on information provided during the generic design assessment (GDA) of the UK EPR™ reactor design. In this GDA, we assessed the acceptability for use in England and Wales of the UK EPR™ against environmental protection and waste management matters. The Office for Nuclear Regulation assessed its use in the United Kingdom against safety and security issues. We issued a final statement of design acceptability (SoDA) in December 2012.

In 2013, we completed an assessment of an application from NNB GenCo Ltd, now called NNB GenCo (HPC) Ltd, for combustion activities at the Hinkley Point C (HPC) nuclear licensed site in Somerset which is currently under construction. NNB Generation Company (SZC) Limited is a sister company to NNB GenCo (HPC) Ltd. The nuclear power station at Hinkley Point C is of the same design, and NNB Generation Company (SZC) Limited proposes to replicate, so far as is practicable, the Hinkley Point C development at the Sizewell site.

The Sizewell site is located on the east coast of the United Kingdom, approximately 1.5km north-east of the town of Leiston in the county of Suffolk. NNB Generation Company (SZC) Limited proposes to construct a new nuclear power station at a location immediately north of the existing Sizewell A and B power stations. The proposed new power station is known as Sizewell C.

The company has applied for operational environmental permits many years ahead of planned operations beginning. It is expected that any combustion activities would not take place at Sizewell C (SZC) before the mid-2030s. However, we consider that there are significant benefits in regulating at an early stage of site-specific design and during the

development of the operator's organisational capabilities. We recognise that the detailed arrangements for operations and compliance are not yet fully developed. However, we still require suitable arrangements and resources to be in place for each phase of the project. This will help ensure that, when operations begin, the power station, its arrangements and resources are ready and suitable to maintain compliance with the requirements of our permits.

The combustion activity will consist of 12 backup diesel generators with a combined net thermal input of 227MW, associated fuel storage tanks and interconnecting pipework. The generators will be housed in 4 purpose-built concrete buildings, each containing 2 x 23.1MWth essential diesel generators (EDG) and one 10.53MWth ultimate diesel generator (UDG).

The diesel generators will be safety classified standby equipment and would only be operated in the event of a power failure and during periodic testing.

The main emissions are to air via exhaust stacks of 27.2 metres in height and will consist of combustion gases containing particulates as well as oxides of sulphur, nitrogen and carbon. Our assessment of the environmental impact of these emissions covers 3 operational scenarios, namely commissioning, routine testing and loss of off-site power (LOOP). Further details are given in the following sections.

Commissioning scenario

During commissioning, each generator will be tested for operation of the loss of off-site power (LOOP) event scenario. EPR™'s 2 pressurised water reactors (unit 1 and unit 2) will be commissioned in consecutive years and therefore the LOOP scenario will be tested individually on each unit. Commissioning also allows the integration of the generators and their sub-systems from construction to their commissioning.

This scenario recognises that only one EDG or UDG is likely to be in operation at any one time. The assessment scenario uses emission rates from the EDG as they have the greater predicted emissions (worst-case scenario).

Long-term impacts have been assessed on the basis of 2,446 operational hours over one year, which represents 4 EDGs operated for 242.5 hours each and 2 UDGs operated for 738 hours each.

Short-term impacts have been assessed on the basis that one EDG might be operated during any hours throughout the years considered in the modelling assessment to capture the worst-case meteorological conditions.

Routine testing scenario

This scenario covers operation of the plant for maintenance and periodic safety tests and involves only a single generator operating at any one time. The assessment scenario uses emission rates from the EDG as these have the greater predicted emissions due to their size.

Long-term impacts are assessed on the basis of 720 hours combined operation of the EDGs, which represents 8 EDGs operated for 60 hours each per year.

Short-term impacts have been assessed on the basis that one EDG is operated continuously throughout the year.

LOOP scenario

This covers an emergency event resulting in loss of off-site power. Only short-term impacts have been assessed as this is not a routine mode of operation for the power station. This is on the basis that all EDGs are running all year.

Main issues

The main issues arising during this determination were air quality and the dispersion of emissions to air, and the impact of these emissions on the local environment.

Our assessment of the air dispersion modelling has concluded that exceedances of the relevant air quality objectives and environmental assessment levels are unlikely. We have also concluded that the operation of the installation has no adverse effect on European sites' integrity and does not damage the special features of the Sites of Special Scientific Interest (SSSI).

1. About this document

This document sets out our final decision on NNB GenCo (SZC) Limited's application for an environmental permit and is accompanied by a permit. It explains how we have considered the application, and why we have included the specific conditions in the permit we are issuing. It is our record of our decision-making process, to show how we have considered all relevant factors in reaching our decision.

This document includes:

- a description of how we process and determine applications (Chapter 2)
- a summary of the application and brief details of our consultation on the application (Chapter 3)
- a description of our assessment (Chapter 4)
- a statement of our final decision (Chapter 5)
- a summary of consultation responses (Appendix 1)

1.1 The Environment Agency

Our corporate strategy Environment Agency: EA2025 creating a better place (Environment Agency, 2020) sets out our aims and describes the role we play in being part of the solution to the environmental challenges society faces.

Our strategy aims to champion sustainable development, support our work to create better places, and challenge us to tackle the climate emergency and provide a green economic recovery for everyone, in 3 long-term goals:

- a nation resilient to climate change
- healthy air, land and water
- green growth and a sustainable future

1.2 Our role in environmental regulation

We regulate the environmental impacts of nuclear sites, such as nuclear power stations, nuclear fuel production plants and plants for reprocessing spent nuclear fuel, through a number of environmental permits. These permits may be needed during the site preparation, construction, operation and decommissioning phases of the plant's lifecycle.

The permits we issue include conditions and limits. In setting these, we take into account all relevant national and international standards as well as legal requirements, to ensure that people and the environment will be properly protected. These standards and requirements are described in:

- Environmental permitting guidance: Core guidance (UK Parliament, 2013)
- Check if you need an environmental permit (Environment Agency, 2016)

We inspect sites to check that operators are complying with the conditions and limits, and that they have arrangements in place to help ensure compliance. We may take enforcement action (for example, issuing an enforcement notice or making a prosecution) if they are not compliant.

We regularly review permits, and vary (change) them if necessary, to ensure that the conditions and limits are still effective and appropriate. Where significant changes are required, we may consult on these changes.

We work closely with the Office for Nuclear Regulation (ONR), which regulates the safety, security and nuclear material safeguards and transport aspects of nuclear sites.

1.3 Our regulatory role in the development of new nuclear power stations

As with existing nuclear sites, any new nuclear power station will require environmental permits from us to cover specific aspects of site preparation, construction, operation and

eventually decommissioning. In the light of government and industry expectation that plants of almost the same design might be built on a number of sites and potentially be run by different operating companies, we have split our process for assessing and permitting the operational stage of new nuclear power stations into 2 phases.

In the first phase, generic design assessment (GDA), we carry out a detailed assessment of the features of a generic reactor design that can affect those aspects of its environmental performance that we regulate. If we are fully content with the environmental aspects of the generic design, we provide a statement of design acceptability (SoDA). If we are largely content, but there are GDA Issues (that is, significant but resolvable outstanding matters), we issue an interim statement of design acceptability (iSoDA). In both cases, we also identify Assessment Findings. These are matters, which a future operator will need to address at the appropriate stage of a new build project, that is, during detailed design, procurement, construction, commissioning or early operation. Where we have issued an iSoDA, we expect the designer to provide further information as it implements its resolution plan. We close GDA Issues only once we are satisfied that they have been fully resolved. Once all GDA Issues are closed, we will consider issuing a full SoDA.

We have carried out GDA of the UK EPR™ design from Électricité de France SA and AREVA NP SAS (‘EDF and AREVA’). We issued a final SoDA for the UK EPR™ in December 2012.

In the second phase, operators wishing to construct and operate nuclear power stations at specific sites are required to make applications for environmental permits. In determining these applications, we take account of the work we have already done during GDA. In this way, our efforts are focused on operator-specific and site-specific matters, including how the operator has addressed any relevant matters arising from GDA and any changes to the GDA design arising from the site-specific considerations or operator required modifications.

Operators can apply to the Environment Agency for a new permit or a variation (change) to an existing permit at any time. We expect GDA to be concluded prior to site-specific permit application, but recognise that this will not always be the case. Where an applicant wishes to take credit for the GDA process, we require a SoDA or iSoDA to be issued prior to consulting on a proposed decision on the permit application. Where only an iSoDA has been issued, we would expect the GDA Issues to be resolved before we would issue a permit.

In the case of Sizewell C, NNB GenCo (SZC)’s proposal is to replicate the station under construction at Hinkley Point C so far as possible, subject to the site’s different characteristics and other relevant matters. Our considerations will include the work we carried out in the GDA for the UK EPR™ and for the NNB GenCo (HPC) project in Somerset, for which we issued permit EPR/ZP3238FH in March 2013. Although the 2 projects are being run by separate legal entities, they both have a significant shareholding by the EDF group of companies, and have arrangements in place to share the design,

knowledge and experience to benefit both. NNB GenCo (SZC) is aiming to replicate the design being deployed at Hinkley Point C.

1.4 NNB GenCo (SZC)'s applications for operational environmental permits

NNB GenCo (SZC) has applied for 3 environmental permits for the power station when it is operational. These are for the operation of the radioactive substances activity (application reference EPR/HB3091DJ/A001), the discharge of cooling water and trade effluent (application reference EPR/CB3997AD/A001) and the operation of the standby diesel generators (application reference EPR/MP3731AC/A001).

We have now considered all 3 applications. This document deals with our consideration of the application for the standby diesel generators. We have produced separate decision documents for the other 2 applications.

NNB GenCo (SZC) has not started to build the proposed power station at Sizewell C. It applied for permission in the form of a Development Consent Order from the Infrastructure Planning Commission (IPC). Consideration of the project has passed to the National Infrastructure Directorate (NID) of the Planning Inspectorate who will make a recommendation to the Secretary of State for a decision.

The overarching National Policy Statement for energy EN1 says, "The planning and pollution control systems are separate but complementary" and that "the IPC should work on the assumption that the relevant pollution control regime and other environmental regulatory regimes, …will be properly applied and enforced by the relevant regulator", also that "the IPC should be satisfied, before consenting any potentially polluting developments, that the relevant pollution control authority is satisfied that potential releases can be adequately regulated under the pollution control framework……"

EN1 also states that "Wherever possible, applicants are encouraged to submit applications for Environmental Permits and other necessary consents at the same time as applying to the IPC for development consent."

NNB GenCo (SZC) applied for the operational permits and we considered the applications at this early stage of the development, so that we were able to provide an update on our progress on our decision-making to the NID at the appropriate time.

We consider that there are significant benefits in early regulation of site-specific design and the development of the operator's organisational capabilities.

In any case, we consider that granting a permit early allows us to specify pre–operational conditions and requirements for further information in the permit, so that environmental matters are considered before the detailed design is finalised. We are also able to influence the commissioning programme to ensure that environmental matters are fully addressed.

When we issue the permit, we will regulate the site in accordance with our guidance to ensure that best available techniques (BAT) are used.

2. How we process and determine applications

The Environment Agency is responsible under The Environmental Permitting (England and Wales) Regulations 2016 (EPR 2016) (UK Parliament, 2016) for regulating certain activities on nuclear sites in England and Wales. This decision document details our assessment of an application for combustion activities, namely:

- operating diesel generators for electricity generation if the main power supply to the site is lost
- commissioning and periodic routine testing of the diesel generators

We regulate these sites to protect members of the public from harm from the discharge and disposal of the release of pollutants into the air, and to protect the wider environment. We regulate within a framework of extensive government policy, strategy and guidance. This framework is summarised in the environmental permitting guidance. This guidance sets out the government's position on how environmental permitting should be applied and implemented, and how both we and operators in England and Wales should interpret particular terms. In summary, the aim of the environmental permitting system is to:

- protect the environment so that statutory and government policy environmental targets and outcomes are achieved
- carry out permitting and achieve compliance with permits and certain environmental targets in a more open way, minimising the administrative burden on both the regulator and the operators
- encourage regulators to promote best practice in operating facilities

Operators can apply to the Environment Agency for a new permit or a variation (change) to an existing permit at any time. The process we follow in assessing applications is outlined below.

1. Pre-application - We encourage applicants to discuss applications with us before submission.
2. Receive and consult on the application - The operator makes an application, providing the information as set out in the application form and supporting guidance. We advertise and consult on all applications for new permits. We may also advertise and consult on some variations, depending on the nature of the proposals and the likely degree of public interest.
3. Assess the application and propose a decision for consultation - We carefully assess the application and any responses received from consultation. We then come to a proposed decision whether to issue the permit and, if so, the appropriate permit conditions.

4. Consultation on proposed decision - We may choose to carry out further consultation on our proposed decision and draft permit, depending on the nature of the proposals and the likely degree of public interest. We do this using a document that explains our proposed decision and a draft permit.
5. Review, approval and grant of decision - Where we consult on our proposed decision, we carefully consider all relevant information we have received during and after consultation, together with existing information. We make a decision on whether we should grant a permit and, if so, what its conditions should be. We publish a document that explains our decision.

We advertised and consulted on this application in accordance with our public participation statement and associated working together arrangements: Environmental permits: when and how we consult (Environment Agency, 2019). In view of the nature of the application and the degree of public interest, we decided to carry out additional consultation on our proposed decision and draft permit. We did not come to a final decision about this application until we had considered the responses to our public consultations.

2.1 Legal, policy and regulatory considerations

We made our decision taking into account all relevant legal, policy and regulatory matters and consultation responses about the application. The main issues we need to consider when making decisions on the application are listed here with reference to relevant documents and guidance.

Management and operator competence

- Develop a management system: environmental permits (Environment Agency, 2016a)
- Control and monitor emissions for your environmental permit (Environment Agency, 2016b)
- Legal operator and competence requirements: environmental permits (Environment Agency, 2016c)

Technical assessment

- Medium combustion plant and specified generator permits: how to comply (Environment Agency, 2019a)
- Medium combustion plant and specified generators: environmental permits (Environment Agency, 2019b)
- Medium Combustion Plant Directive (EU) 2015/2193 (The European Parliament and the Council of the European Union, 2015)
- Industrial Emissions Directive 2010/75/EU (The European Parliament and the Council of the European Union, 2010)
- Oil storage regulations for businesses (Environment Agency, 2015)
- Noise and vibration management: environmental permits (Environment Agency, 2021)

Monitoring

- Monitoring stack emissions: techniques and standards for periodic monitoring (Environment Agency, 2021a)

In the following sections of this document, we explain how we have reached our decision against these and any other relevant considerations.

While we will normally determine an application, the Secretary of State can require any application to be sent to them for determination (regulation 63 of the EPR 16). As noted in the EPR core guidance (UK Parliament, 2020), this would be an exceptional step and likely to be taken only if the application involves issues of more than local importance, for example, if the application:

- is of substantial regional or national significance
- is of substantial regional or national controversy
- may involve issues of national security or of foreign governments

The core guidance also says that any decision on the need for determination by the Secretary of State would be made solely on those grounds, with no consideration of the substantive merits of the application itself.

The Secretary of State has not 'called in' this application.

In specific circumstances and within statutory timescales, appeals regarding the determination of an application must be made to the Secretary of State. They may appoint another person, generally the Planning Inspectorate (PINS) to determine an appeal on their behalf. Further details regarding appeals can be found in EPR core guidance (UK Parliament, 2020).

3. The application and our consultation on the application

3.1 Receipt of application

The application was duly made on 23 June 2020. This means we considered it was in the correct form and contained sufficient information for us to begin our determination, but not that it necessarily contained all the information we would need to complete that determination.

The application was deemed to be considered high public interest following the initial advertising period based on the level of public interest shown.

NNB GenCo (SZC) applied for an environmental permit to carry out combustion activities at a proposed new nuclear power station at Sizewell, in Suffolk. The proposed new power station is known as Sizewell C power station.

NNB GenCo (SZC) (Company number 09284825) was incorporated in 2014. It is a wholly owned subsidiary of NNB Holding Company (SZC) Limited, which, in turn, is owned by EDF Energy Holdings Limited (80% share) and General Nuclear International Limited (20% share). EDF Energy Holdings Limited and General Nuclear International Limited are ultimately owned by EDF SA and China General Nuclear Power Corporation (CGN) respectively. NNB GenCo (SZC) is known locally, and for some of the planning applications, as ‘EDF SZC Co'.

NNB GenCo (SZC)’s application consisted of the relevant environmental permit application forms and a submission of information to provide the required detailed technical information.

Construction of the proposed Sizewell C power station has not yet commenced. There are a number of areas where the organisation or the detailed design of the facilities will need to be developed. NNB GenCo (SZC) proposed a forward action plan to deal with these matters within its application.

3.2 Location of the site

The proposed combustion plant would be located on the east coast of the United Kingdom approximately 3km north-east of the town of Leiston in the county of Suffolk. The proposed location of the new nuclear power station is immediately north of the 2 existing Sizewell power stations.

There are a number of international and national environmental designated sites close to Sizewell. These are:

- Southern North Sea Special Area of Conservation (SAC)
- Orfordness-Shingle Street Special Area of Conservation (SAC)
- Minsmere to Walberswick Heaths and Marshes Special Area of Conservation (SAC)
- Alde, Ore and Butley Estuaries Special Area of Conservation (SAC)
- Sandlings Special Protection Area (SPA)
- Outer Thames Estuary Special Protection Area (SPA)
- Minsmere-Walberswick Special Protection Area (SPA)
- Alde-Ore Estuary Special Protection Area (SPA)
- Minsmere-Walberswick Ramsar
- Alde-Ore Estuary Ramsar
- Minsmere to Walberswick Heaths and Marshes Site of Special Scientific Interest (SSSI)
- Leiston-Aldeburgh Site of Special Scientific Interest (SSSI)
- Sizewell Marshes Site of Special Scientific Interest (SSSI)

3.3 Description of the proposed facility

The proposed facility consists of 12 backup diesel generators, with a combined net thermal input of 227MW, associated fuel storage tanks and interconnecting pipework. The generators will be housed in 4 purpose-built concrete buildings, each containing 2 x 23.1MWth essential diesel generators (EDG) and one 10.53MWth ultimate diesel generator (UDG).

The diesel generators are safety classified standby equipment and will only be operated in the event of a power failure and during periodic testing.

The main emissions are to air via exhaust stacks of 27.2 metres in height and will consist of combustion gases containing particulates and oxides of sulphur, nitrogen and carbon.

3.4 Requests for further information

Although we were able to consider the application duly made, we did in fact need more information to determine it.

We requested further information by e-mail on 14 and 22 July 2020. These requests were in relation to missing documents such as the air quality and noise modelling files.

We also issued an information notice on 21 May 2021. We can serve a notice on the applicant in accordance with Schedule 5 of the EPR 2016. We refer to these notices as Schedule 5 Notices.

In our Schedule 5 Notice we asked for:

- a detailed BAT cost benefit justification on the chosen diesel generators
- remodelling of the habitats assessment using more realistic operational scenarios
- assessment of the impacts against the daily NOx critical level for a LOOP event
- information about the typical number of hours a day that the generators could be running in all operational scenarios
- the submission of an air quality management plan
- the amendment of the site condition report to include pollution incidents since 2012

We also requested further information by e-mail on 2 March 2022 on the actual operating hours during the commissioning phase and if ultra-low sulphur gas oil is used.

We placed a copy of each information request and the response on our public register.

We assessed the information provided and consider it met our requirements. We consider the information provided supports the information already submitted with the application.

We have explained how we have considered the further information NNB GenCo (SZC) provided at the relevant place in this document, where we explain our assessment of the application.

3.5 Confidential information

NNB GenCo (SZC) has not made a claim for commercial or industrial confidentiality. We have not identified information provided as part of the application that we consider to be confidential. The decision was taken in accordance with our guidance on confidentiality.

3.6 Consultations on the application and proposed decision

We advertised and consulted on NNB GenCo (SZC)'s application from 6 July to 2 October 2020 and on our proposed decision between 4 July and 25 September 2022, in accordance with our Environmental permits: when and how we consult (Environment Agency, 2019) and the government's published Consultation principles (Cabinet Office, 2012).

We carried out an equality analysis to inform our public engagement activities. We subsequently published our engagement plan for Sizewell C's environmental permits.

Our consultations were open to everyone. We invited the public, the energy industry, academics with an interest in nuclear power, energy or the environment, non-governmental organisations and other organisations and public bodies to take part.

We have placed the responses to our consultations on the public register, except where the person making the response asked us not to do so. We can provide copies of documents available on public registers. We are currently transforming our public register capability to be available online, but if this service is not available at the time of any request, you can still contact us and request documents by telephone or email. We also published responses made using our e-consultation tool online on our consultation hub.

Promoting the consultations

We asked national and local stakeholders for their views on the consultation process before our consultations began. They provided feedback about their communities, the channels they use to read information and their preferred methods of engagement. We considered their responses and the extra challenges of the application consultation being carried out during coronavirus restrictions and we published our consultation plan.

We believe that the level of local and national engagement was proportionate for the consultations. We are confident that we did all we reasonably could and consulted properly during the period of coronavirus restrictions. We are also confident that the consultations were accessible to, and targeted at, the people and organisations they were intended for.

To raise awareness and encourage participation, we:

- emailed contacts on our stakeholder database. Our database includes national organisations and people who live near the Sizewell site such as parish and local

councils, non-government organisations (NGOs), environmental groups, professional institutions, nuclear and environmental academics, the nuclear industry and trade unions
- published information and documents on GOV.UK and our e-consultation tool which hosted our documents and enabled an online response
- provided a plain English, high-level summary. In this, we were clear about the consultation process and the scope of the consultations
- worked with NNB GenCo (SZC) to make copies of the application available on USB memory sticks
- updated local MPs through briefings
- advertised the consultations in local print and online newspapers (East Anglian Daily Times and the Ipswich Star), which could be read by people living near the Sizewell site in Suffolk and nationally
- issued press releases to trade, national and local media. This resulted in some coverage in print and online media
- posted information on social media (Twitter) to promote links to our consultation pages
- worked with third parties and advocates such as local parish, town and county councils, NGOs and environmental groups, securing their support to raise awareness
- added information to NNB GenCo (SZC)'s newsletters which are sent to all households in the area and an email subscriber list
- provided information about the consultations to NNB GenCo (SZC) for it to use in its communications to stakeholders and the public (such as its company newsletter)
- provided information to our staff closest to the site so they would be able to answer questions from the public in the area

To engage directly with stakeholders during the consultations, we:

- held 3 public events on our proposed decision in the locality of Sizewell in July 2022. These took place in Saxmundham, Aldeburgh and Leiston. We also held a virtual stakeholder event in September 2022. The public and virtual events were attended by permitting staff from the Environment Agency with expert technical knowledge
- organised a public question and answer session on the application consultation by phone. We provided speakers from the Environment Agency with expert technical knowledge. We also put in place processes to enable people to respond to the consultation over the telephone
- advertised the events widely online and sent details to our stakeholder database
- highlighted the consultations to members of the Department for Business, Energy and Industrial Strategy (BEIS) NGO forum
- informed attendees of our bi-annual nuclear regulator local engagement meetings which we hold with stakeholders in Essex and Suffolk
- provided a postal address for those who did not want to, or couldn't use email or the e-consultation tool

Appendix 1 provides further details of our consultations on the application and our proposed decision. It also summarises the comments we received in response to our initial consultations on NNB GenCo (SZC)'s application and our proposed decision, along with how we have considered them in coming to a final decision.

4. Our assessment

4.1 Introduction

This section sets out our final decision based on our assessment of the application and consideration of the responses to our consultation on it. There are a number of matters we need to consider before coming to a decision on whether to issue a permit and, if so, subject to what conditions.

In reaching our decision, we have sought to take into account the relevant legislation, government policy and guidance, our own guidance and the responses to the consultation on the application and proposed decision. Chapter 2 summarises the main documentation that describes these requirements.

There are also a number of issues that are outside our remit and which we have therefore not considered when reaching our final decision. We have set out these issues in section 4.9.

4.2 Description of the installation and related issues

4.2.1 The permitted activities

This application is to operate an installation which is subject principally to the Industrial Emissions Directive (IED) (Chapter II). Aggregation rules under the Article 29 of IED are not applicable to this installation as releases to air are not via a common stack, nor do we think that they should be. For the purpose of nuclear safety, each diesel generator must have a separate, independently operated stack.

The installation is subject to the Environmental Permitting Regulations 2016 (EPR 2016) because it carries out an activity listed in Part 1 of Schedule 1 to the EPR:

Section 1.1 A(1) (a): Burning any fuel in an appliance with a rated thermal input of 50 megawatts or more.

Individual combustion plants (EDGs 23.1MWth and UDGs 10.53MWth) within the activity listed above are also medium combustion plants and therefore are also subject to the Medium Combustion Plant Directive (MCPD).

An installation may also comprise ‘directly associated activities’, which at this installation includes fuel oil storage. In total, these activities are one installation, because the diesel generators and fuel storage are successive steps in an integrated activity.

Together, these listed and directly associated activities comprise the installation.

4.2.2 The site

NNB GenCo (SZC) submitted a plan which we consider is satisfactory, showing the site of the installation and its extent. A plan is included in Schedule 7 to the permit, and the operator is required to carry out the permitted activities within the site boundary.

The Sizewell C combustion plant installation is located on the Suffolk Heritage Coast adjacent to the existing Sizewell B power station, approximately 1km north from the village of Sizewell and 3km to the north-east of the town of Leiston. The surrounding land use is a mixture of industrial and agricultural land. The North Sea is located immediately to the east. Sizewell Marshes are located adjacent to the west and north-west of the installation. Leiston Beck is located adjacent to the west of the installation, which then joins the Minsmere River, approximately 2km north. The installation will lie within the nuclear licensed site boundary. The centre of the Sizewell C combustion plant site is located at Ordnance Survey National Grid Reference (NGR) co-ordinates TM 47270 64145.

The centres of each of the 4 diesel buildings that comprise the installation are located at the following Ordnance Survey NGR co-ordinates:

- reactor 1, diesel building 1 TM 47239 63890
- reactor 1, diesel building 2 TM 47239 64064
- reactor 2, diesel building 1 TM 47239 64122
- reactor 2, diesel building 2 TM 47239 64297

4.2.3 What the installation does

NNB GenCo (SZC) has described the installation as backup diesel generators for the Sizewell C power station.

Other combustion plant at Sizewell C power station will be covered through applications for variations to the environmental permit.

There will be 4 separate but identical essential diesel generators (EDGs) for each of the EPR’s 2 units. These are required in order to restore the power supply in the event of the loss of off-site power. In total, there will be 8 EDGs.

In addition, there will be 2 further separate diesel generators per reactor (4 in total) to supply power in the event of loss of both off-site supplies and the EDGs. These additional generators are referred to as the ultimate diesel generators (UDGs) and will be started manually from the main control room within 2 hours (equivalent to the reserve time of the station’s batteries) of plant blackout occurring.

Plant design

Each diesel generator (EDG and UDG) is a self-contained plant in a separate room in each of the diesel buildings. Each building will contain 2 EDGs and one UDG. The plant comprises:

- diesel fuel system

The EDG main diesel fuel oil storage tank will have a 226m^3 capacity and the smaller day tank will have a 5.46m^3 capacity. The day tank has enough capacity to allow operation at full load or maximum combustion rate (MCR) for 2 hours. The UDG main diesel fuel oil storage tank will have a 137m^3 capacity and the day tank will have a 3m^3 capacity (sufficient for operating at full load for at least 2 hours).

- lubricating oil system

The EDGs will have a self-contained lubrication system using a coupling booster pump. A pre-lubrication device fitted with a recirculating electrical pump reduces the time taken for the engine to start. The UDG plant will have continuous pre-lubrication, although it is not required.

- coolant system

The cooling system will be air cooled, with a closed loop water-based coolant. The heat produced by the diesel generators is transferred via a cooling loop to a heat exchanger. Continuous pre-heating will be carried out for both the EDG and UDG plant.

- start-up air system

Each diesel generator will have a complete compressed air start-up plant comprising a compressor, 2 start-up lines (with one being enough to start an engine), start-up valves and one (or more) tanks where the capacity of a single tank is enough for several consecutive compressor start-ups without refilling.

- air intake and extract system

Air will be supplied for combustion and is designed to avoid any recirculation of flow. Combustion air will be taken from outside the building and filtered before use.

- local instrumentation and control/alarm signalling

The diesel generators can be started locally from the control panel to allow tests to be carried out (measurements and plant data are recorded by the panel); remotely from the main control room; or automatically by a signal from the protection systems (for EDGs, and for UDSs only in certain plant states).

The application proposes that the EDGs and UDGs are installed in separate rooms in the diesel buildings; 2 EDGs and one UDG per building. The buildings will be located separately to protect against simultaneous damage, and positioned to allow easy

movement of the diesel generators in and out of the buildings for maintenance purposes. The buildings are designed to withstand a range of internal and external hazards.

Each generator will exhaust through its individual stack, which is located on the roof of the diesel building 27.2 metres above ground level. All tanks will be bunded to meet the requirements of our web guide Oil storage regulations for businesses (Environment Agency, 2015).

Both the EDGs and UDGs will undergo test runs to demonstrate reliability. If for any reason a diesel generator fails to start during a test run, a further test run would be required. The detailed test programme will depend on the station safety specification and manufacturer's recommendations.

Availability

The EDGs are safety related plant qualified as 'Category K3 Equipment' according to RCC-E (design and construction rules for electrical components of PWR nuclear islands). This qualification confirms the plant is capable of performing its design functions under seismic and accidental, as well as normal, conditions.

Operational regime

There are 3 main types of operational regime covered by this application:

- commissioning
- routine testing
- LOOP events

Commissioning

During commissioning, it is not anticipated that more than one EDG or UDG will be in operation at any one time. Each EDG and UDG will be operated for 242.5 hours and 738 hours respectively, during its testing period, that is 4,892 combined hours. It should be noted that some of the 738 hours needed for commissioning the UDGs will involve tests that can be carried out before the engines are brought to site. The commissioning hours presented therefore represent a worst-case estimate of the time for which plant will be run during this phase. It also should be noted that commissioning operations were not considered in the generic design assessment (GDA) as this is a site-specific activity that depends on manufacturer's recommendations.

Routine testing

Experience of operating similar diesel generator plant in France suggests that each EDG and UDG will be operated for less than 60 hours per year. A conservative assumption (set out here) is therefore made for the basis of the air quality assessment. A figure of 60 hours per year will be used as the maximum annual run time for each EDG and UDG diesel generator. In practice, it is expected that running hours will be lower than this conservative figure as the required hours for tests are lower.

Typical test run is expected to be as follows:

At least 20 minutes to raise the load on the generator from 0% to 100%; operation at 100% load for 180 minutes; and at least 20 minutes to reduce the load from 100% to 0%.

A routine test is expected to last somewhere between 3 hours 40 minutes and 5 hours per month. This equates to 44 to 60 hours a year. Only one generator will undergo routine testing at a time.

LOOP

During a LOOP event, the EDGs sequentially take load automatically to supply all safety classified loads required to bring the plant up to and maintain it at a safe shutdown state. This is for LOOP and total loss of AC power (TLAP). The UDGs do the same but for station blackout and TLAP.

Following a LOOP event, the EDGs are not immediately shut down when LOOP is over, in order to ensure that off-site power has been successfully secured.

The duration of LOOP events cannot be easily determined. The safety case LOOP durations vary from a very short LOOP (less than 2 hours, typically 30 minutes) to a very long LOOP (15 days). A short LOOP is expected to occur a limited number of times during the lifetime of the plant; and a long LOOP is expected to occur about once in the lifetime of a fleet of nuclear sites.

4.3 The site and its protection

4.3.1 Site condition report

NNB GenCo (SZC) submitted a site condition report (Appendix B of the combustion activity submission Sizewell C) detailing the environmental setting of the site (including geology, hydrogeology and hydrology), pollution history and historical land use of the proposed site. This includes baseline soil and groundwater condition data. However, these soil and groundwater investigations have not specifically covered the area underneath the installation and were mainly carried out to provide geotechnical information with limited contamination test data available for the site. In addition, as part of the construction of the proposed Sizewell C power station development, a cut off wall will be installed, and a cut and fill exercise will be carried out, whereby the superficial material will be excavated down to the Crag sand and replaced with Crag sand sourced from another area of the site. The Crag sand has been tested for leachability of contaminants. However, no soil data is available for this material.

Therefore, in areas of the installation where no baseline data has been collected to date, NNB GenCo (SZC) has confirmed that further investigation will be carried out, predominantly to validate the Crag sand at the site and verify the imported materials for potential contamination sources. Based on this, we have accepted NNB GenCo (SZC)’s proposal to carry out further investigations when the layout is finalised and during

excavations completed during the construction phase and closer to the start of the operations.

We have set a pre-operational condition PO2 to ensure the characterisation of the soil and groundwater is completed and suitable protective measures are adopted. This condition requires NNB GenCo (SZC) to submit a written report to the Environment Agency on the baseline conditions of soil and groundwater at the installation. The report must contain the information necessary to determine the state of soil and groundwater contamination so as to make a quantified comparison with the state upon definitive cessation of activities provided for in Article 22(3) of the Industrial Emissions Directive (IED). The report must contain information, in addition to that already provided in the application site condition report, to meet the information requirements of Article 22(2) of the IED.

The baseline report is an important reference document in the assessment of contamination that might arise during the operational lifetime of the installation and once activities at the installation cease.

The Industrial Emissions Directive (IED) also requires that risk assessments or periodic monitoring of ground and groundwater beneath the site should be carried out throughout the life of the permit, so that the absence of pollution to these environmental media from operations at the site can be demonstrated. Pre-operational condition PO2 and condition 3.1.2 of the permit secures and makes provision for this requirement.

In addition, we have set a pre-operational requirement PO3 in the permit, to require NNB GenCo (SZC) to submit a detailed site drainage plan and the design details of the containment infrastructure relating to this installation, including all sub-surface structures and equipment. The operator must also provide an inspection and maintenance programme for the containment infrastructure and equipment at the site. This information is requested under pre-operational requirements as NNB GenCo (SZC) did not have detailed drainage information available at the time of the determination of the application.

The decision was taken in accordance with our guidance on site condition reports and baseline reporting under the Industrial Emissions Directive.

4.3.2 Site history and geology

A review of historical maps by NNB GenCo (SZC) established the following:

From 1883, the installation’s location is recorded as open fields, farmland, marshland and woodland with drains running across the wider site area. Several roads and tracks are present transecting this area at Lover’s Lane and Abbey Road. Sand pits are located in the vicinity of the installation. Between 1928 and 1958, a rifle range is labelled in the area of the central installation. A wind pump is present adjacent to Upper Abbey. Mapping from 1976 reveals earthworks in the south of the site, suggesting that the site has been raised. There are also a number of tracks on a grid crossing the site and the area to the immediate south of the site. The rifle range is no longer shown. There is a sewage works (Leiston Sewage Treatment Works) to the west of the site. By the publication of the 2006

map, Sizewell B Power Station had been developed further north and had encroached onto the southern section of the site. An aerial photo from 1999 shows the northern area as undeveloped and the southern area developed as part of Sizewell B, including various buildings and a storage area. The 2021 aerial photo shows additional development, including a car park adjacent to the storage area, while the northern area of the site remains undeveloped.

The solid geology mapping indicates that the installation is located upon the Crag Group (sand), which is further underlain by white chalk. Geological mapping indicates various superficial deposits such as peat and tidal deposits located beneath the installation. Made ground was encountered in the majority of exploratory hole locations. Reportedly, the ground surface was raised with surplus spoil from the construction of Sizewell A between 1964 and 1971.

The site is not located within a listed groundwater source protection zone (SPZ). However, the site is underlain by a secondary A aquifer associated with the superficial deposits. The Crag Group (sand) is classified as a principal aquifer. There are 7 permitted active groundwater abstractions located within 2km of the installation, with the closest being a groundwater abstraction point at the existing Sizewell B Power Station located 450m south of the installation for makeup or top up water from the marine deposits. The remaining permitted active groundwater abstractions are located between 900m and 1,990m from the installation and are for makeup or top up water, spray irrigation and water transfer.

4.3.3 Proposed site design: potentially polluting substances and prevention measures

The proposed features of the installation for the prevention of pollution to ground and groundwater are detailed here.

Bulk fuel storage and secondary containment

The detailed design of the fuel storage facilities is not yet known. However, NNB GenCo (SZC) confirms that all tanks will be located in buildings. The pollution prevention measures for fuels and oils stored and handled at the installation will comply with or exceed the relevant standards applicable at the time of construction. Current best practice for above ground oil storage in bulk tanks is in accordance with our web guide Oil storage regulations for businesses (Environment Agency, 2015).

In accordance with these guidelines, NNB GenCo (SZC) proposes the following for the design and construction of the installation.

- Safe access to the tanks for maintenance.
- Areas where oil is stored are surfaced with a material that is impermeable to the substances stored and isolated from surface water drainage systems.
- Tanks comply with BS 5410 and are of sufficient strength and structural integrity so that they are unlikely to leak during normal operations, are positioned on appropriately designed and constructed supports, and if possible, have a design life of 20 years.

- Tanks are type tested to a recognised standard under a quality assurance system complying with BS EN ISO 9001:2000*, and steel tanks comply with BS 799-5:1987*.
- Installation of tanks is carried out by technicians registered with a professional scheme such as that operated by the Oil Firing Technical Association (OFTEC).
- Tanks and their ancillary equipment (such as sign gauges, valves and vent pipes) are situated within an oil tight secondary containment system such as a bund.
- Shut-off valves will be installed at extended fill points, drip trays or other containment systems will be present at fill points, and remote fill points will be avoided where possible (if used they will comply with BS 799-5;1987*).
- Fixed pipework will be above ground where possible and where this is supplying oil to fixed appliances will comply with BS 5410*.

* The primary and secondary containment measures will be compliant with the standards valid at the time of construction.

Devices such as high level alarms to prevent overfilling will be used in bulk tanks. An automatic overfill prevention device will be fitted if the tank and vent pipe cannot be seen from where the filling operation is controlled. Internal tanks will be located within a fire-resistant chamber.

It is not known whether the bulk fuel tanks will be stand-alone tanks or hydraulically linked. However, secondary containment will be adequate to contain 110% of the tank capacity or a minimum of 25% of the total capacity of several tanks within a bunded area. Bulk tanks at the installation will benefit from being located inside a building to protect them from the weather.

Fuel pumps and delivery pipes

Fuel pumps will either be located such that any leaks can be captured within the secondary containment serving the tanks or alternative secondary containment measures will be used. Pumps will be fitted with a check valve in their feed line to prevent the tank contents emptying in the event of damage to the pump or feed line.

Underground pipework will be avoided in the design if possible and, if used, will be double skinned and/or laid in accessible ducts where possible.

Testing and inspection

All tanks, pipes and pumps will be regularly inspected as part of the power station’s environmental management system (EMS). High level alarms and other equipment will also be subject to regular testing.

Underground pipework, if present, will be tested for leaks at least every 5 or 10 years, depending on whether there are mechanical joints. Manufacturer’s test instructions and other guidance, such as British Standard 5410 Parts 2 and 3 and BS 799-5, will be followed.

Management systems will be in place during site operations to generate alerts when equipment tests are due and when equipment is likely to be reaching the end of its design life.

Tests and inspections will be carried out by competent persons.

Fuel delivery

Diesel delivery to the bulk tanks will be by road tanker via connection of a flexible delivery hose to a fill point either within the diesel generator building or within a designated bunded area outside the building. The offloading process will be compliant with our web guide Oil storage regulations for businesses (Environment Agency, 2015) with regard to collection of drips during filling, general housekeeping, location of fill points and use of automatic shut-off valves. Drainage from the tanker offloading area will be controlled to prevent any fuel spills or leakages reaching ground or surface water drainage, although the detailed design of the site drainage is not yet known. Pre-operational condition PO3 requires the operator to provide a detailed as-installed site drainage plan, including construction details of any sub-surface structures, containment and surfacing infrastructure before operations at the site begin.

NNB GenCo (SZC) will take adequate measures to ensure that the risk of tanker collision on site is managed, with due consideration given to traffic route design, on-site signage, speed limits, barriers, driver and/or banksman training and site housekeeping.

Drummed storage of lubricating oil, waste oil, antifreeze and waste cooling mixture used or produced at the installation will take place on site but outside the installation boundary. The handling and storage of these materials will be compliant with best practice (for example, our web guide Oil storage regulations for businesses (Environment Agency, 2015). This is in order to prevent spills and leaks during transport and to ensure that spills or leaks from stored containers (prior to use or disposal) are captured and dealt with quickly, to prevent releases to ground or to surface water drains. Quantities of oils and chemicals stored on site will be managed to ensure that the minimum volumes required for safe operations are maintained but, where possible, not exceeded.

We are satisfied that the above measures and implementation of the operational phase of the site condition report will result in there being no significant risk of pollution to the land or groundwater beneath the site from the operational activities at the installation.

4.3.4 Closure and decommissioning

Having considered the information submitted in the application, we are satisfied that the appropriate measures will be in place for the closure and decommissioning of the installation. Pre-operational condition PO1 requires the operator to have an EMS in place before the installation is operational, which would include a site closure plan.

NNB GenCo (SZC) must satisfy us, if it wants to surrender (cancel) the permit, that it has taken the necessary measures, both to avoid any pollution risk resulting from the operation

of the installation, and to return the site to a satisfactory state, having regard to the state of the site before the installation was put into operation. To do this, NNB GenCo (SZC) must apply to surrender the permit, which we will not grant unless and until we are satisfied that these requirements have been complied with.

4.4 Operation of the installation – general issues

4.4.1 Operator

Under EPR 2016, we can only grant a permit if the applicant will be the 'operator', that is, the applicant will have effective control over the operation of the facility. Also, we must not grant a permit if we consider that the operator will not, or cannot, operate the facility in compliance with the permit.

We are satisfied that NNB GenCo (SZC) is the person who will have control over the operation of the facility when the permit is granted. We have taken this decision in accordance with our web guide Legal operator and competence requirements: environmental permits (Environment Agency, 2016c).

4.4.2 The regulated facility

We considered the extent and nature of the facility at the site in accordance with RGN2 ‘Understanding the meaning of regulated facility’, Appendix 2 of RGN2 ‘Defining the scope of the installation’, and Appendix 1 of RGN 2 ‘Interpretation of Schedule 1’.

NNB GenCo (SZC) has provided the grid references for the emission points from the standby diesel generators. The extent of the facility is defined in the site plan and in the permit. The activities are defined in Table S1.1 of the permit.

4.4.3 The site

NNB GenCo (SZC) has provided a plan which we consider to be satisfactory. This shows the extent of the site of the facility. The plan is included in the permit.

4.4.4 Management

NNB GenCo (SZC) has stated in its application that it will implement an environmental management system (EMS) that will be certified under ISO14001. Pre-operational condition PO1 is included in the permit, requiring NNB GenCo (SZC) to provide a summary of the EMS prior to commissioning of the plant, and to make all EMS documentation available for inspection at site visits. We recognise that certification of the EMS cannot take place until the installation is operational. Improvement condition IC1 is included in the permit, requiring the operator to report progress towards gaining accreditation of its EMS.

We are not aware of any reason to consider that NNB GenCo (SZC) will not have the management system to enable it to comply with the permit conditions. We have taken this decision in accordance with our web guide Legal operator and competence requirements: environmental permits (Environment Agency, 2016c).

4.4.5 Site security

Having considered the information submitted in the application, we are satisfied that appropriate infrastructure and procedures will be in place to ensure that the site remains secure.

4.4.6 Accident management

NNB GenCo (SZC) has submitted a preliminary accident management plan for the combustion activity. Having considered the plan and other information submitted in the application, we are satisfied that appropriate measures will be in place to ensure that accidents that may cause pollution are minimised as far as possible, but that, if they should occur, their consequences are minimised. An accident management plan will form part of the EMS and must be in place prior to commissioning as required by pre-operational condition PO1.

4.4.7 Operating techniques

We have reviewed the techniques used by the operator and compared these with the relevant guidance. We consider them to represent appropriate techniques for the facility.

- Medium combustion plant and specified generator permits: how to comply (Environment Agency, 2019)

We have specified that the operator must use the operating techniques detailed in Table S1.2 of the permit.

We have also specified limits and controls on the use of raw materials and fuels. The operator must comply with the limits specified in Table S2.1 of the permit.

The installation will be designed, constructed, and operated using BAT. We are satisfied that the operating techniques are BAT for the installation. Our assessment of BAT is set out later in this document in section 4.7.

4.4.8 Energy efficiency

Consideration of energy efficiency

We have considered the issue of energy efficiency in the following ways:

The use of energy within, and generated by, the installation which are normal aspects of all permit determinations under the Environmental Permitting Regulations 2016, as amended. This issue is dealt with in this section.

The combustion efficiency and energy utilisation of different design options for the installation are relevant considerations in determining BAT for the installation. This aspect is covered in the BAT assessment section 4.7 of this document.

Use of energy within the installation

Having considered the information submitted in the application, we are satisfied that appropriate measures will be in place to ensure that energy is used efficiently within the installation.

NNB GenCo (SZC) states that the specific energy consumption (SEC), a measure of total energy consumed per unit of output, is of limited importance for standby plant. This is because efficiency is a secondary measure to reliability/availability, and under normal operations, plant will only be operated for maintenance purposes and during periodic testing. In addition, the plant is only operated at its optimum state for short periods before being shut down.

We accept that due to the operational regime of the generators, SEC is not an appropriate measure for the installation.

Generation of energy within the installation

The installation will generate electricity only and has been specified to maximise electrical output with little or no use of waste heat. All the electricity generated from loaded test runs will be exported to the National Grid with that generated by the reactor. Electricity produced at the installation can only be exported to the National Grid when the emergency generators are operated for testing and commissioning purposes. Elective operation of the emergency generators to provide balancing services or demand side response services is not permitted.

The operator is required to report with respect to electricity export under condition 4.2 and Schedule 4 of the permit.

Permit conditions concerning energy efficiency

Permit condition 1.2.1 requires the operator to use energy efficiently.

There are no site-specific considerations that require the imposition of standards beyond indicative BAT, and so we accept that NNB GenCo (SZC)’s proposals represent BAT for this installation.

4.4.9 Efficient use of raw materials

Having considered the information submitted in the application, we are satisfied that the appropriate measures will be in place to ensure the efficient use of raw materials and water.

The operator is required to report with respect to raw material usage under condition 4.2 and Schedule 4, in respect of fuel oil usage.

4.4.10 Avoidance, recovery or disposal with minimal environmental impact of wastes produced by the activities

Having considered the information submitted in the application, we are satisfied that the waste hierarchy referred to in Article 4 of the Waste Framework Directive (WFD) will be applied to the generation of waste and that any waste generated will be treated in accordance with this Article.

We are satisfied that waste from the installation that cannot be recovered will be disposed of using a method that minimises any impact on the environment. Standard condition 1.4.1 will ensure that this position is maintained.

4.4.11 Climate change adaptation

Having considered the information submitted in NNB GenCo (SZC)'s climate change adaptation risk assessment, we consider it satisfactory.

The risk assessment concludes that given the Sizewell C combustion plant is anticipated to be operated for approximately 40 to 60 years, it is considered likely to be at risk from the impacts of climate change. The risk assessment highlights that increases in temperature could have an impact on the plant's ventilation system. However, NNB GenCo (SZC) confirms that additional cooling systems and building insulation will be considered at the design stage of the plant which will mitigate the risk. Climate change variables, increase in peak rainfall intensity and annual rainfall are also considered to be risks given their potential to overload surface water drainage systems through flash flooding and prolonged rainfall. To mitigate against this impact, NNB GenCo (SZC) proposes to increase the site's surface water storage capacity and consider surface water falls at the design stage.

Based on the risk assessment, the most significant risk is posed by increasing sea levels. The site is located within an area at risk of flooding (Flood risk 3) because of rivers or seas without defences. However, the site will be protected against flooding from the sea by its elevation. This may not ensure a dry site under all conditions, but the elevation was determined as a solution that is as low as reasonably practicable (ALARP). NNB GenCo (SZC) has also carried out a flood risk assessment, which takes into consideration changes in extreme high-water levels due to reasonably foreseeable climate change.

Matters such as flood risk are generally dealt with under other regimes and/or by other bodies and not as a part of our determination of this permit. We have provided advice and guidance on flood risk in our consultation response relating to NNB GenCo (SZC)'s application to the planning inspectorate for a Development Consent Order (DCO). The Office for Nuclear Regulation considers flood risk as part of the safety case required by the nuclear site licence. This includes an assessment of climate change projections aligned with UK Climate Projections 2018 (UKCP18). Ultimately, this work will review and assess the adequacy of NNB GenCo (SZC)'s Hinkley power station design against the Sizewell C site requirements and will make up part of the SZC pre-construction safety report justification.

To ensure that risks posed by climate change are reviewed and evaluated regularly, we have decided to include condition 1.5.1 in the permit, requiring the operator to review and update its climate change risk assessment over the life of the permit.

4.5 The installation's environmental impact

Regulated activities can present different types of risk to the environment. These include noise and vibration, accidents, fugitive emissions to air and water, as well as point source releases to air, discharges to ground or groundwater, global warming potential and generation of waste and other environmental impacts. Consideration may also have to be given to the effect of emissions being subsequently deposited onto land (where there are ecological receptors). The main factors relevant to this determination are discussed in this and other sections of this document.

For an installation of this kind, the principal emissions are those to air, although we also consider those to land.

The next sections of this document explain how we have approached the critical issue of assessing the likely impact of the emissions to air from the installation on human health and the environment.

4.5.1 Emissions to air

Application of Environment Agency methodology for air emissions risk assessment

A methodology for risk assessment of point source emissions to air, which we use to assess the risk of applications we receive for permits, is set out in our web guide Air emissions risk assessment for your environmental permit (Environment Agency, 2016d).

It has the following steps:

- Describe emissions and receptors
- Calculate process contributions
- Screen out insignificant emissions that do not warrant further investigation
- Decide if detailed air modelling is needed
- Assess emissions against relevant standards
- Summarise the effects of emissions

The methodology uses a concept of ‘process contribution (PC)’, which is the estimated concentration of emitted substances after dispersion into the receiving environmental media at the point where the magnitude of the concentration is greatest. The guidance provides a simple method of calculating PC primarily for screening purposes and for estimating process contributions where environmental consequences are relatively low. It is based on using dispersion factors. These factors assume worst-case dispersion conditions, with no allowance made for thermal or momentum plume rise. So, the process contributions calculated are likely to be an overestimate of the actual maximum concentrations. Process contributions can be more accurately calculated using mathematical dispersion models, which take into account relevant parameters of the release and surrounding conditions, including local meteorology.

Use of air dispersion modelling

For an installation of this kind, we usually require the operator to submit a full air dispersion model as part of its application, which assesses the main pollutants. Air dispersion modelling enables the process contribution to be predicted at any environmental receptor that might be impacted by the plant.

Once short-term and long-term PCs have been calculated in this way, they are compared with environmental quality standards (EQS).

Where an EU EQS exists, the relevant standard is the EU EQS. Where an EU EQS does not exist, our guidance sets out a national EQS (also referred to as environmental assessment level - EAL). This has been derived to provide a similar level of protection to human health and the environment as the EU EQS levels. In a very small number of cases, for example, for emissions of lead, the national EQS is more stringent than the EU EQS. In such cases, we use the national EQS standard for our assessment.

National EQSs do not have the same legal status as EU EQSs, and there is no explicit requirement to impose stricter conditions than BAT in order to comply with a national EQS. However, national EQSs are a standard for harm and any significant contribution to a breach is likely to be unacceptable.

PCs are considered **insignificant** if:

- the **long-term** process contribution is less than **1%** of the relevant EQS
- the **short-term** process contribution is less than **10%** of the relevant EQS

The **long-term** 1% process contribution insignificance threshold is based on the judgements that:

- it is unlikely that an emission at this level will make a significant contribution to air quality
- the threshold provides a substantial safety margin to protect health and the environment

The **short-term** 10% process contribution insignificance threshold is based on the judgements that:

- spatial and temporal conditions mean that short-term process contributions are transient and limited in comparison with long-term process contributions
- the threshold provides a substantial safety margin to protect health and the environment

Where an emission is screened out in this way, we would normally consider the operator's proposals for the prevention and control of the emission to be BAT. That is because if the impact of the emission is already insignificant, it follows that any further reduction in this emission will also be insignificant.

However, where an emission cannot be screened out as insignificant, it does not mean it will necessarily be significant.

For those pollutants which do not screen out as insignificant, we determine whether exceedances of the relevant EQS are likely. This is done through detailed audit and review of the operator's air dispersion modelling, taking background concentrations and modelling uncertainties into account. Where an exceedance of an EU EQS is identified, we may require the operator to go beyond what would normally be considered BAT for the installation or we may refuse the application if the applicant is unable to provide suitable proposals. Whether or not exceedances are considered likely, the application is subject to the requirement to operate in accordance with BAT.

This is not the end of the risk assessment, because we also take into account local factors (for example, particularly sensitive receptors nearby such as Sites of Special Scientific Interest (SSSIs), Special Areas of Conservation (SACs) or Special Protection Areas (SPAs). These additional factors may also lead us to include more stringent conditions than BAT.

If, as a result of reviewing the risk assessment and taking account of any additional techniques that could be applied to limit emissions, we consider that emissions would cause significant pollution, we would refuse the application.

Assessment of impact on air quality

NNB GenCo (SZC) assessed the installation's potential emissions to air against the relevant air quality standards, and potential impact on local habitat sites and human health. These assessments predicted the potential effects on local air quality from the installation's stack emissions using the ADMS 5 Version 5.2 dispersion model, which is a commonly used computer model for regulatory dispersion modelling. The model used 5 years (2014 to 2018) of meteorological data collected from the weather station at Wattisham, which is 46km south-west of the installation. The impact of the terrain surrounding the site on plume dispersion was considered in the dispersion modelling. The concentrations reported in the assessments were the maximum ground level concentrations predicted by the dispersion modelling packages over the 5 years of meteorological data.

The air impact assessments, and the dispersion modelling on which they were based, used the following assumptions.

Firstly, that the input parameters would be consistent with those determined through consultation with EDF and information made available from equipment manufacturers.

Secondly, and conservatively, they considered 3 operational scenarios, namely commissioning, routine testing and loss of off-site power (LOOP). Further details are given in the following sections.

Commissioning scenario

Commissioning is not usually considered. However, due to the periodic operational regime for the diesel generators, the emissions from commissioning are likely to be one of the more significant impacts. Therefore, we have assessed them in more detail than we would usually do for a combustion activity.

This scenario recognises that only one EDG or UDG is likely to be in operation at any one time and the scenario uses emission rates from the EDG as these represent the worst case.

Long-term impacts have been assessed on the basis of 4,892 operational hours over one year, which represents 8 EDGs operated for 242.5 hours each and 4 UDGs operated for 738 hours each.

Short-term impacts have been assessed on the basis that one EDG might be operated during any hours throughout the years considered in the modelling assessment to capture the worst-case meteorological conditions.

Routine testing scenario

This covers operation of the plant for maintenance and periodic safety tests and involves only a single generator operating at any one time. The assessment scenario uses emission rates from the EDG as these represent the worst case as they have the greater predicted emissions.

Long-term impacts are assessed on the basis of 720 hours combined operation of the EDGs, which represents 8 EDGs operated for 60 hours each per year.

Short-term impacts are assessed on the basis that one EDG is operated continuously throughout the year.

LOOP scenario

This covers an event resulting in loss of off-site power for 24 hours, with all 8 EDGs operating. The scenario does not include operation of UDGs as these would only operate if the EDGs failed to start and their combined impact would be less than that of the 8 EDGs.

NNB GenCo (SZC)’s air quality modelling provided us with modelled outputs showing the concentration of main pollutants at a number of specified locations within the surrounding area. We have reviewed the way in which the operator used dispersion models, its

selection of input data, use of background data and the assumptions it made to establish the robustness of the operator's assessment. The output from the model has then been used to inform further assessment of health impacts and impact on habitats and conservation sites.

Our review of NNB GenCo (SZC)'s modelling leads us to agree with its conclusions with regards to emissions to air. We have also audited NNB GenCo (SZC)'s air quality modelling assessment report (Appendix C of the combustion activity submission Sizewell C) and similarly agree that the conclusions drawn in the report with regards to human health are reasonable. We did not agree with NNB GenCo (SZC)'s conclusions with regards to the impact on habitats and conservation sites and therefore we requested further information from the operator via Schedule 5 Notice on 21 May 2021, and via email on 1 March 2022. The impact on conservation sites is considered in section 4.5.4.

This section of the decision document deals primarily with the dispersion modelling of emissions to air from the installation and its impact on human health. Impact on habitats and nature conservation sites is discussed in section 4.5.4.

The emission concentrations used for modelling purposes are detailed in Table 1.

Table 1. Emission concentrations

Diesel generators	Nitrogen oxides (mg/m^3)	Sulphur dioxide (mg/m^3)	Carbon monoxide (mg/m^3)	Particulates (mg/m^3)
EDG stacks	1,900	182	150	50
Emission point concentration (0°C, 15% O_2, 101.3 Pa and dry)				

NNB GenCo (SZC)'s modelling predictions are summarised in Tables 2 to 6. The tables show the ground level concentrations at the most impacted receptor. Where a relevant short or long-term EQS or EAL has been established, we have assessed the potential contribution of pollutants with respect to the appropriate standard.

Commissioning scenario

Table 2. Long-term modelling predictions

Pollutant	EQS/EAL	Background concentration	Process contribution (PC)	PC as % of EQS/ EAL	Predicted environmental concentration (PEC)	PEC as % EQS / EAL
Nitrogen dioxide	40	5.9	0.6	1	6.5	16
Particulates PM_{10}	40	12.3	0.02	<0.1	12.3	31
Particulates $PM_{2.5}$	20	7.7	0.02	<0.1	7.7	38
All the concentration figures are in µg/m³.						

Table 3. Short-term modelling predictions

Pollutant	EQS/EAL	Background concentration	Process contribution (PC)	PC as % of EQS/ EAL	Predicted environmental concentration (PEC)	PEC as % EQS / EAL
Nitrogen dioxide	200	5.9	170.6	85	182.4	91
Particulates PM_{10}	50	12.3	1.4	6	25.9	51.8
Carbon monoxide	30,000	92	65.6	0.2	250	0.8
Sulphur dioxide	266	3.95	26.3	10	34.2	12.8
All the concentration figures are in µg/m³. **For the assessment of short-term impacts, the PEC is determined by adding twice the long-term background concentration to the short-term process contribution.**						

Routine testing scenario

Table 4. Long-term modelling predictions

Pollutant	EQS/EAL	Background concentration	Process contribution (PC)	PC as % of EQS/ EAL	Predicted environmental concentration (PEC)	PEC as % EQS/ EAL
Nitrogen dioxide	40	5.8	0.2	0.5	6	15
Particulates PM_{10}	40	12.3	0.006	0.015	12.3	31
Particulates $PM_{2.5}$	20	7.5	0.006	0.03	7.5	38
All the concentration figures are in µg/m³.						

Table 5. Short-term modelling predictions

Pollutant	EQS/EAL	Background concentration	Process contribution (PC)	PC as % of EQS/ EAL	Predicted environmental concentration (PEC)	PEC as % EQS/ EAL
Nitrogen dioxide	200	5.9	41.6	20.8	53.2	26.6
Particulates PM_{10}	50	12.3	0.3	0.6	24.8	50
Carbon monoxide	30,000	92	15.5	0.05	199.5	0.7
Sulphur dioxide	266	3.95	17.3	6.5	25.2	9.5
All the concentration figures are in µg/m³. **For the assessment of short-term impacts, the PEC is determined by adding twice the long-term background concentration to the short-term process contribution.**						

LOOP scenario

Long-term

NNB GenCo (SZC) did not assess the long-term LOOP event due to the short-term nature of the release which would be unlikely to contribute significantly to concentrations averaged over longer periods.

We agree with NNB GenCo (SZC)'s assessment that long-term emissions from the LOOP scenario do not need assessment for the above reason.

Short-term

Table 6. Short-term modelling predictions

Pollutant	EQS/EAL	Background concentration	Process contribution (PC)	PC as % of EQS/ EAL	Predicted environmental concentration (PEC)	PEC as % EQS/ EAL
Nitrogen dioxide	200	5.9	256.8	128.4	268.4	134.2
Particulates PM_{10}	50	12.3	2.4	4.8	27	54
Carbon monoxide	30,000	92	75	0.25	259	0.86
Sulphur dioxide	266	3.95	31.7	12	39.6	14.9

All the concentration figures are in µg/m^3.

For the assessment of short-term impacts, the PEC is determined by adding twice the long-term background concentration to the short-term process contribution.

From Tables 2 to 6, the following emissions can be screened out as insignificant, as the PC is <1% of the long-term EQS/EAL and <10% of the short-term EQS/EAL:

- carbon monoxide for all scenarios
- particulates (PM_{10} and $PM_{2.5}$) for all scenarios
- nitrogen dioxide for long term (commissioning and routine testing scenario)
- sulphur dioxide for short term (commissioning and routine testing scenario)

Also, from the same tables, the following emissions, which were not screened out as insignificant, cannot be considered to potentially give rise to significant pollution, as the predicted environmental concentration is less than 70% of the long-term EQS/EAL and the PC is less than 20% of the short-term EQS/EAL headroom:

- sulphur dioxide for short term (LOOP scenario)

For all these emissions, we have carefully scrutinised NNB GenCo (SZC)'s proposals to ensure that it is applying the best available techniques (BAT) to prevent and minimise emissions of these substances. This is reported in section 4.7 of this decision document.

Table 7. Consideration of impacts where PEC is >70% of EQS long term or the PC short term is >20% of the short-term headroom

Pollutant	EQS/ EAL	Background concentration	Process contribution (PC)	PC as % of EQS/ EAL	Predicted headroom (EQS/EAL - 2x background)	PC as % of headroom
Short-term nitrogen dioxide emissions (commissioning scenario)	200	5.9	170.6	85	188.2	91
Short-term nitrogen dioxide emissions (routine testing scenario)	200	5.9	41.6	20.8	188.2	22
Short-term nitrogen dioxide emissions (LOOP scenario)	200	5.9	256.8	128.4	188.2	136
All the concentration figures are in µg/m^3. **For the assessment of short-term impacts, the PEC is determined by adding twice the long-term background concentration to the short-term process contribution.**						

Finally, from Table 7, the following emissions are considered to potentially give rise to pollution as the PEC exceeds 70% of the long-term EQS/EAL or the PC exceeds 20% of the short-term EQS/EAL headroom:

- short-term nitrogen dioxide emissions (commissioning scenario)

- short-term nitrogen dioxide emissions (routine testing scenario)
- short-term nitrogen dioxide emissions (LOOP scenario)

For the commissioning and routine testing emissions, it can be concluded that exceedances of the relevant EQS/EAL are unlikely. The only predicted exceedance of EAL is for short-term NO_2 during a LOOP event. However, the LOOP scenario is highly unlikely and represents the operation of the generators in the event of total power failure, and is designed to prevent radioactive releases. It is also worth recognising that the modelled emissions represented worst-case scenarios both in hours of operation and meteorological conditions. The LOOP event was modelled by running all 8 EDGs all year which does not represent an actual LOOP event. Also, it is very unlikely that a real LOOP event would coincide with the worst-case meteorological conditions. Based on this, we are satisfied that the operation of the generators poses a low risk to human health.

In any case, with respect to these pollutants, we have carefully scrutinised NNB GenCo (SZC)'s proposals to ensure that it is applying BAT to prevent and minimise emissions of these substances. This is reported in section 4.7 of this decision document.

4.5.2 Emissions to water

NNB GenCo (SZC) states in its application that there will be few, if any, emissions to water from the diesel generators. The only surface water run-off will be rainwater draining from the roofs. This will be collected at the bottom of the UDG stacks. A connection manhole will be provided for each building, which will drain, along with the uncontaminated rainwater from the rest of the Sizewell C site, to the outfall with the cooling water. The drainage plan is not currently available and therefore this will be provided under a pre-operational condition PO3. The wider site will be covered by hardstanding, and oil interceptors will be provided at all locations where fuel handling takes place. Diesel and chemicals on site will be bunded and there will be no internal drains within the diesel rooms. Any spills will be captured in a sump and pumped out and disposed off-site as hazardous waste.

As there is the potential for point source releases to water from surface water run-off, Table S3.2 of the permit includes a reference to this point source emission. No emission limits have been set as the release is uncontaminated surface water.

4.5.3 Noise impacts

NNB GenCo (SZC) submitted a detailed noise assessment (Appendix E of the combustion activity submission Sizewell C), which identifies local noise-sensitive receptors, potential sources of noise at the proposed plant and noise attenuation measures.

NNB GenCo (SZC) identifies the primary sound sources as:

- exhaust stacks on the roof for dispersion of combustion gases. Three stacks per building, one per generator
- two fresh air intakes at mid-level, one either side of the building of each generator, a total of 6 per generator building

- two fresh air in/warm air out louvres per generator at higher level, a total of 6 per generator building

NNB GenCo (SZC) proposes the following noise attenuation measures:

- The standby diesel generators will be housed in concrete buildings, which offers significant attenuation of the sound generated through combustion operations.
- The standby diesel generators will be part of the site routine maintenance programme, and, as such, will be maintained to a high standard that is reflective of the operational control required at a nuclear power station.
- When operating, the operation of the generators would be continuous, however this would be for less than 1% of the year. Where periodic tests and maintenance are required, they will be planned within daylight hours where possible, to minimise potential disturbance.
- In the event that noise complaints were to arise, NNB GenCo (SZC) will respond in accordance with its noise management strategies set out in the relevant code of operational practice.

We are satisfied that NNB GenCo (SZC)'s noise assessment is carried out in accordance with BS4142:2014, which is the correct standard for assessing industrial and commercial sound. In accordance with this standard, NNB GenCo (SZC) took measurements of the prevailing ambient noise levels to produce a baseline noise survey and to compare the predicted plant rating noise levels with the established background levels.

The assessment considers that the worst-case scenario in terms of sound sources operating would be during LOOP events when 2 EDGs are operating in each generator building. During the commissioning and routine testing phase, each generator would be tested individually, and therefore the resultant sound levels would likely be lower than those predicted for the LOOP scenario.

Table 8 shows how the predicted rating level compares to the background levels at the receptors near to the installation during the LOOP event. Impacts at receptors further away will be lower.

Table 8. Rating level compared to the background levels – LOOP event

Rating level compared to background (dB A) - LOOP event		
	Daytime	Night-time
Sizewell village	-12	-8
Rosery Cottage	-6	-5
Halfway Cottages	-12	0

Keepers Cottage	+5	+12
Common Cottages	0	+7
Reckham Lodge	+3	+11
Upper Abbey Farm	-1	-7
Ashwood Cottages	+1	+6

For this scenario during daytime, except for Keepers Cottage, the predicted sound rating level represents a low or very low magnitude of change compared with typical existing background sound levels. This results in a minor to negligible effect, and therefore is not considered to represent a significant impact from noise. At Keepers Cottage, the assessment predicts a possibility of a significant adverse impact. However, given the unlikelihood of a LOOP event taking place, the assessment considers that these predicted impacts are not significant.

For night time, at Sizewell village, Rosery Cottage, Halfway Cottages and Upper Abbey Farm, the predicted rating level to all receptors represents a low or very low magnitude of change compared with typical existing background sound levels. This would result in a minor to negligible effect, and therefore is not considered to represent a significant impact from noise.

However, at Keepers Cottage, Common Cottages, Reckham Lodge and Ashwood Cottages, the assessment predicts a potentially significant impact during the LOOP scenario. However, as during daytime, the predicted impacts are not considered significant as the LOOP scenario would only arise during an emergency, and therefore may not occur at all.

We audited NNB GenCo (SZC)'s noise assessment. Based on our review, we agree with the conclusions of the assessment that the impact from the proposed emergency generators during the LOOP scenario will be low. The LOOP scenario may not happen during the lifespan of the proposed development, and in any case, the predicted levels are low. We also predicted the rating level for the commissioning phase and routine testing scenarios for the residential receptors. These predictions have been carried out to assess sound levels at Keepers Cottage and Peckham Cottage, and at Ash Wood Cottages and Upper Abbey Farm (the likely worst-affected receptors with these sources). We predict that the impact from the generators during the commissioning and routine testing phases at all residential receptors will be low.

Although we agree with NNB GenCo (SZC)'s conclusion that adverse or significant adverse impacts are unlikely at nearby receptors, we have included an improvement condition IC2 in the permit, specifying that the operator is required to carry out a

monitoring study to verify the assumptions made in the application in relation to the acoustic data once the site is operational. This is to minimise uncertainty of the modelling results and to establish whether additional mitigation measures need to be incorporated into the design.

Based on the information in the application, we are satisfied that the appropriate measures will be in place to prevent or, where that is not practicable, to minimise noise and vibration, and to prevent pollution from noise and vibration outside the site subject to the completion of the improvement condition IC2.

Noise impacts on the habitats and nature conservation sites are discussed in section 4.5.4.

4.5.4 Impact on habitats and nature conservation sites

In this section, we have considered the impact of the proposed discharges on the environment. We have also considered the impact in relation to our duties under various statutory provisions. We refer to these as ‘conservation duties’.

Regulation 63 of the Conservation of Habitats and Species Regulations 2017

Before deciding to undertake or grant a permit which:

(a) is likely to have a significant effect on a European site or a European offshore marine site (either alone or in combination with other plans or projects)

(b) is not directly connected with or necessary to the management of that site

we must make an appropriate assessment of the implications for that site in view of that site’s conservation objectives, and we must consult Natural England if there is a significant effect.

Section 28G of the Wildlife and Countryside Act 1981

We must take reasonable steps, consistent with the proper exercise of our functions, to further the conservation and enhancement of the flora, fauna, or geological or physiographical features, by reason of which a Site of Special Scientific Interest (SSSI) is of special interest.

Section 28I of the Wildlife and Countryside Act 1981

We are under a duty to consult Natural England/Natural Resources Wales before permitting any operation which is likely to damage any flora, fauna or geological or physiographical features by reason of which a SSSI is of special interest.

Section 85 of the Countryside and Rights of Way Act 2000

In exercising or performing any functions in relation to, or so as to affect, land in an area of outstanding natural beauty, a relevant authority shall have regard to the purpose of conserving and enhancing the natural beauty of the area of outstanding natural beauty.

European sites

We have considered the potential effects of discharges to air from the site on plant and animal life at the relevant designated 'European sites' (Special Protection Areas (SPAs) for birds, and Special Areas of Conservation (SACs) for other species, and for habitats) under the Conservation of Habitats and Species Regulations 2017 (as amended), which implement the Habitats and Birds Directives, and Ramsar sites, which are wetlands of international importance designated under the Ramsar Convention. Government policy gives Ramsar sites an equivalent level of protection as SAC and SPAs. These are collectively known as 'European sites'.

The following European sites are located within the screening criteria of 10km of the installation:

Minsmere to Walberswick Heaths and Marshes SAC: adjacent

- European dry heaths
- annual vegetation of drift lines
- perennial vegetation of stony banks

The SAC is vulnerable to the direct effects of toxic contamination, nutrient enrichment and acidification (APIS).

Minsmere-Walberswick SPA: adjacent

- great bittern (breeding)
- Eurasian marsh harrier (breeding)
- pied avocet (breeding)
- little tern (breeding)
- European nightjar (breeding)
- hen harrier (non-breeding)

Nationally important breeding populations:

- Eurasian teal (breeding)
- northern shoveler (breeding)
- gadwall (breeding)

Nationally important wintering populations:

- greater white-fronted goose (non-breeding)
- northern shoveler (non-breeding)

- gadwall (non-breeding)

The SPA is vulnerable to the direct effects of toxic contamination and nutrient enrichment. However, the supporting features of the notable bird species are not vulnerable to acidification. APIS states that “there is no expected negative impact on the species due to impacts on the species’ broad habitat.”

Minsmere-Walberswick Ramsar: adjacent

Ramsar criterion 1:

- the site contains a mosaic of marine, freshwater, marshland and associated habitats, complete with transition areas in between. Contains the largest continuous stand of reedbeds in England and Wales and rare transition in grazing marsh ditch plants from brackish to fresh water

Ramsar criterion 2:

- this site supports 9 nationally scarce plants and at least 26 red data book invertebrates. Supports a population of the mollusc narrow-mouthed whorl snail (Habitats Directive Annex II; British Red Data Book Endangered), recently discovered on the Blyth estuary river walls
- an important assemblage of rare breeding birds associated with marshland and reedbeds, including great bittern, gadwall, Eurasian teal, northern shoveler, Eurasian marsh harrier, pied avocet and bearded tit

The Ramsar is vulnerable to the direct effects of toxic contamination, nutrient enrichment and acidification.

Outer Thames Estuary SPA: <1km

- common tern
- little tern
- red-throated diver

The SPA is vulnerable to the direct effects of toxic contamination and nutrient enrichment (APIS) for the supporting habitat of the little tern and common tern features. There is not expected to be any negative impact on the red-throated diver from the emissions or deposition of NOx and SO_2.

Southern North Sea SAC: <1km

- harbour porpoise

This site is within the screening distance criteria. However, it was not relevant for an assessment under the Habitats Regulations due to a lack of connectivity with the designated feature.

Sandlings SPA: 1km

- nightjar (breeding)
- woodlark (breeding)

The supporting habitat of the SPA features is vulnerable to the direct effects of toxic contamination, nutrient enrichment and acidification (APIS).

Alde, Ore and Butley Estuaries SAC: 5km

- Atlantic salt meadows
- estuaries
- mudflats and sandflats not covered by seawater at low tide (intertidal mudflats and sandflats)

The SAC is vulnerable to the direct effects of toxic contamination and nutrient enrichment. However, the notable habitat features of the SAC are not vulnerable to acidification (APIS).

Alde-Ore Estuaries SPA: 5km

- avocet (breeding)
- avocet (non-breeding)
- little tern (breeding)
- marsh harrier (breeding)
- ruff (non-breeding)
- sandwich tern (breeding)

Nationally important breeding populations:

- lesser black-backed gull

Nationally important wintering populations:

- redshank (non-breeding)

The SPA is vulnerable to the direct effects of toxic contamination and nutrient enrichment. However, the supporting features of the notable bird species are not vulnerable to acidification. APIS states “there is no expected negative impact on the species due to impacts on the species’ broad habitat.”

Alde-Ore Estuaries Ramsar: 5km

Ramsar criterion 2:

- the site supports a number of nationally-scarce plant species and British Red Data Book invertebrates

Ramsar criterion 3:

- the site supports a notable assemblage of breeding and wintering wetland birds

Ramsar criterion 6 – species/populations occurring at levels of international importance:

- lesser black-backed gull (breeding)
- pied avocet (non-breeding)

- common redshank (non-breeding)

The Ramsar is vulnerable to the direct effects of toxic contamination and nutrient enrichment. However, it is not vulnerable to acidification.

Orfordness-Shingle Street SAC: 8km

- coastal lagoons
- annual vegetation of drift lines
- perennial vegetation of stony banks; coastal shingle vegetation outside the reach of waves

The SAC is vulnerable to the direct effects of toxic contamination, nutrient enrichment and acidification (APIS).

Dew's Pond SAC: 9km

- great crested newt

There is no comparable habitat with established critical load or levels available for the great crested newt's supporting habitat of open water (ponds) on APIS, with a decision recommended to be taken on a case-by-case basis.

We also considered Sizewell Marshes SSSI and Minsmere to Walberswick Heaths and Marshes SSSI (where it occurs outside of the European site) as they provide additional habitat for birds from nearby SPA, also known as 'functionally linked land'.

Screening for likely significant effects

Guidance on carrying out an assessment of likely significant effect for aerial emissions is set out in the Environment Agency's operational instruction 66_12, the principles of which were followed by NNB GenCo (SZC). Section 5.1 of NNB GenCo (SZC)'s shadow Habitats Regulations assessment (HRA) (Appendix D of the combustion activity submission Sizewell C) sets out this agreed methodology for the assessment of likely significant effects from aerial pollutants.

This guidance sets out that if the process contribution (PC) for long-term emissions is:

- <1% critical level or load, emissions from the application are not significant
- >1% critical level or load, emissions from the application have the potential to be significant, the relevant predicted environmental concentration (PEC) at the European site must be considered: PEC = PC + background
- PEC <70% critical level or load, emissions from the application are not significant
- PEC >70% critical level or load, emissions from the application are significant and an appropriate assessment is required

Consideration must also be given to the short-term effects of pollutants on protected sites, including NO_x. Detailed assessment at protected sites is required where modelling predicts that the PC is >10% of critical level. There is no requirement to consider short-term effects

in combination with background (PEC) as the effects are short lived and not persistent in the environment. There are no short-term critical loads.

The commissioning and operation of diesel generators at the installation are set in the context of a wider project, including radioactive substances activity and water discharge activity permits and will also be subject to construction permits. Due to the timescales involved in the construction of the installation, a precautionary in-combination assessment was carried out where the PEC was predicted to be <70% critical level or load. This is to ensure that this threshold will not be exceeded when considering other competent authority plans, permissions and projects (PPP) that will take place prior to the operation of the installation, and where there is enough information available to inform an assessment.

NNB GenCo (SZC) carried out air quality modelling assessment, which was used to inform the screening for likely significant effects. It represents the worst-case precautionary approach, with emission levels that are unlikely to be reached in reality. We consider this approach appropriate for screening purposes.

NNB GenCo (SZC) referenced the Air Pollution Information System (APIS) to identify the qualifying features at greatest risk of a likely significant effect from the combustion activity emissions, and the criteria used to assess the direct toxic effects of the emissions (critical levels) and the deposition of nutrient nitrogen and acidification (critical loads). We have reviewed these and can confirm them as appropriate for use.

NNB GenCo (SZC) then reviewed the following qualifying features for the sites to determine whether they are sensitive to the risks associated with combustion activities:

- direct toxic effect of the pollutants
- nutrient enrichment
- acidification

NNB GenCo (SZC) used ADMS 5.2 air dispersion modelling software to predict impacts of emissions and deposition from the installation at modelled habitat receptor points within the relevant SAC, SPA and Ramsars.

We audited NNB GenCo (SZC)'s assessment of the potential impact on the local habitats. We requested NNB GenCo (SZC) carry out further modelling of the impacts during the determination of the application as we could not agree with all conclusions of its assessment.

The air emissions consist of combustion gases containing particulates and oxides of sulphur, nitrogen and carbon. The emissions which are relevant for this assessment are oxides of sulphur and nitrogen. This modelling was used to inform our appropriate assessment of the application.

NNB GenCo (SZC)'s modelling predictions at the nearest European site, the Minsmere to Walberswick Heaths and Marshes SAC and Minsmere-Walberswick SPA/Ramsar, are summarised in Tables 9 to 14.

Commissioning scenario

NNB GenCo (SZC) did not assess the short-term NOx effects for commissioning. NNB GenCo (SZC)'s air quality modelling assessment states that there are no commissioning operating scenarios which could lead to emissions from the generators occurring over a 24-hour period. Therefore, impacts against the daily NOx critical level have only been assessed for routine testing operations. We concluded that this was incorrect as the plant will have an impact on ecological sites even if it does not operate for the whole 24-hour period. As a result, we completed our own assessment which is used to inform the commissioning short-term NOx assessment.

Table 9. Long-term and short-term modelling predictions

Pollutant	Critical level ($\mu g/m^3$)	PC ($\mu g/m^3$)	PC >Y[1)]% CL	Background	PEC ($\mu g/m^3$)	PEC > 70% CL
NOx (long term)	30	13.5	Yes 45%	10.06	23.56	Yes 79%
NOx (short term)	75	223.8	Yes 298%	N/A	N/A	N/A
SO_2	20	0.5	Yes 2%	0.6	1.1	No 6%
SO_2 (lower plants)	10	0.5	Yes 5%	0.6	1.1	No 11%
[1)] Y= 1% long term; 10% short term						

Table 9 shows that the modelled process contribution (PC) for the commissioning is greater than 1% of the long-term relevant critical level for NO_x and the PEC is predicted to be greater than 70% of the critical level.

Short-term emissions of NO_x are predicted to be greater than 10% of the short-term critical level during commissioning scenario.

Therefore, we conclude that there is a likely significant effect alone on the Minsmere to Walberswick Heaths and Marshes SAC and Minsmere-Walberswick SPA and Ramsar from the short and long-term direct toxic effects of NO_x from the commissioning of SZC combustion plant. An appropriate assessment was therefore required of the short-term and long-term direct toxic effects of NO_x from the commissioning of the installation.

For SO_2, the modelled PC for the commissioning is 2% of the critical level for the protection of vegetation and 10% of the critical level for lichens and bryophytes associated with the designated European dry heaths habitat. Consideration of the PEC is therefore required for these scenarios.

The PEC is predicted to be significantly less than 70% of the long-term relevant critical levels for SO_2 for the commissioning (protection of vegetation and lichens and bryophytes). No further assessment is required.

Table 10. Assessment of nutrient enrichment

Modelling point	Minimum critical load (kgN/ha/yr)	PC (KgN/ha/yr)	PC >1% CL	Background	PEC (KgN/ha/yr)	PEC > 70%
E2b	8	0.44	Yes 6%	13.8	14.24	Yes 178%
E2c	10	1.14	Yes 11%	13.8	14.94	Yes 149%
E2e	15	0.07	No 0.5%	N/A	N/A	N/A

Table 10 shows that the modelled PC for the commissioning is predicted to be greater than 1% of the relevant critical loads for nitrogen deposition except for modelling point E2e. This is the modelling point for the broad habitat feature fen, marsh and swamp (swamp and reed beds).

The PC at modelling point E2e is predicted to be 0.5% of the critical load for the broad habitat fen, marsh and swamp (swamp and reedbeds). These levels can therefore be considered to be insignificant and there will be no likely significant effect alone and in combination.

The PEC is greater than 70% of the relevant critical load for nitrogen deposition at modelling points E2b and E2c. We conclude that there will be a likely significant effect alone, in the context of prevailing environmental conditions, on the Minsmere to Walberswick Heaths and Marshes SAC and Minsmere-Walberswick SPA and Ramsar from the effects of nutrient enrichment due to the commissioning for the following broad habitats and supported species:

- perennial vegetation of stony banks, little tern

- European dry heath, nightjar

An appropriate assessment was therefore required of nitrogen deposition with regards to the modelling points E2b and E2c from the commissioning of the installation.

Table 11. Assessment of process contribution of acidification

Modelling point	PC N keq/ha/yr	PC S keq/ha/yr	PC>1% CL	Background N keq/ha/yr	Background S keq/ha/yr	PEC N keq/ha/yr	PEC S keq/ha/yr	PEC > 70%CL
E2b	0.03	0.02	Yes 5%	1	0.1	1.03	0.21	Yes 199%
E2c	0.08	0.05	Yes 11%	1	0.1	1.08	0.15	Yes 99%
E2e	0.005	0.003	Yes 2%	1	0.1	1.01	0.1	Yes 195%

Table 11 shows the modelled PCs are more than 1% of the critical load function for acidification, therefore consideration of the PEC is needed.

The PECs are greater than 70% of the critical load functions, therefore there is likely to be a significant effect alone**,** in the context of prevailing environmental conditions, on the interest features of the Minsmere to Walberswick Heaths and Marshes SAC and Minsmere-Walberswick Ramsar. An appropriate assessment of acidification from the commissioning of the installation was therefore required.

The features of the Minsmere-Walberswick SPA are not sensitive to the effects of acidification on their supporting habitat; an assessment was therefore not required.

Routine testing scenario

Table 12. Long-term and short-term modelling predictions

Pollutant	Critical level ($\mu g/m^3$)	PC ($\mu g/m^3$)	PC >Y[1)]% CL	Background ($\mu g/m^3$)	PEC ($\mu g/m^3$)	PEC > 70%
NOx (long term)	30	3.9	Yes 13%	10.06	13.96	No 47%

NOx (short term)	75	303.6	Yes 405%	N/A	N/A	N/A
SO_2	20	0.1	No 0.5%	N/A	N/A	N/A
SO_2 (lower plants)	10	0.1	Yes 1%	0.6	0.7	No 7%
[1] Y= 1% long term; 10% short term						

Table 12 shows the modelled process contribution (PC) for the routine operation is greater than 1% of the long-term relevant critical level for NO_x. However, the PEC is predicted to be less than the likely significant effect threshold of 70% of the critical level.

Where the PEC is less than the likely significant effect threshold of 70%, an appropriate assessment is not required, due to there being no risk that the critical level will be exceeded. However, in this instance, a precautionary in-combination assessment is required to determine if there is the potential for a likely significant effect with other plans, permissions or projects that could result in the PEC threshold being exceeded, due to the length of time before the installation will become operational.

Only plans or permissions commencing operation after 31 December 2018 need to be considered in combination to avoid double counting. Any emissions before that date are already accounted for as part of the modelled PEC within the European site.

Based on our assessment, we concluded that there will be no likely significant effect alone and in combination on the Minsmere to Walberswick Heaths and Marshes SAC and Minsmere-Walberswick SPA and Ramsar from the direct toxic long-term effects of NO_x from the routine operation of the installation.

Short-term emissions of NO_x are predicted to be greater than 10% of the short-term critical level during the routine operation of the installation. We therefore concluded that there will be a likely significant effect alone on the Minsmere to Walberswick Heaths and Marshes SAC and Minsmere-Walberswick SPA and Ramsar from the direct toxic short-term effects of NO_x from the routine operation of the installation. An appropriate assessment was therefore required of the short-term direct toxic effects of NO_x from the routine operation of the installation.

For SO_2, the modelled PC for the routine operation is 0.5% of the critical level for the protection of vegetation and is therefore insignificant.

For SO_2, the PC for the routine operation is 1% of the critical level for lichens and bryophytes. Consideration of the PEC is therefore required for this scenario. The PEC is predicted to be significantly less than 70% of the long-term relevant critical levels for SO_2

for the routine operation (protection of lichens and bryophytes). No further assessment was required.

Table 13. Assessment of nutrient enrichment

Modelling point	Minimum critical load (kgN/ha/yr)	PC (KgN/ha/yr)	PC >1% CL	Background	PEC (KgN/ha/yr)	PEC > 70%
E2b	8	0.13	Yes 2%	13.8	13.93	Yes 174%
E2c	10	0.33	Yes 3%	13.8	14.13	Yes 141%
E2e	15	0.02	No 0.1%	N/A	N/A	N/A

Table 13 shows the modelled PC for the routine operation is predicted to be greater than 1% of the relevant critical loads for nitrogen deposition, except for modelling point E2e. This is the modelling point for the broad habitat feature fen, marsh and swamp (swamp and reed beds).

The PC at modelling point E2e is predicted to be 0.1% of the critical load for the broad habitat fen, marsh and swamp (swamp and reedbeds). These levels can therefore be considered insignificant and there will be no likely significant effect alone and in combination.

The predicted environmental concentration is greater than 70% of the relevant critical load for nitrogen deposition at modelling points E2b and E2c for routine operation. We concluded that there will be a likely significant effect alone, in the context of prevailing environmental conditions, on the Minsmere to Walberswick Heaths and Marshes SAC and Minsmere-Walberswick SPA and Ramsar from the effects of nutrient enrichment due to the routine operation of the installation for the following broad habitats and supported species:

- perennial vegetation of stony banks, little tern
- European dry heath, nightjar

An appropriate assessment of nitrogen deposition with regards to the modelling points E2b and E2c from the routine operation of the installation was therefore required.

Table 14. Assessment of process contribution of acidification

Modelling point	PC N keq/ha/yr	PC S keq/ha/yr	PC>1% CL	Background N keq/ha/yr	Background S keq/ha/yr	PEC N keq/ha/yr	PEC S keq/ha/yr	PEC > 70%CL
E2b	0.009	0.005	Yes 2%	1	0.1	1.01	0.11	Yes 195%
E2c	0.02	0.01	Yes 3%	1	0.1	1.02	0.11	Yes 92%
E2e	0.001	0.0008	No 0%	N/A	N/A	N/A	N/A	N/A

Table 14 shows the modelled PC to be 0% of the critical load function and therefore we concluded no likely significant effect alone and in combination for the fen, marsh and swamp (swamp and reed beds) feature of the Minsmere-Walberswick Heaths and Marshes SAC and Minsmere-Walberswick Ramsar.

The remaining PCs are more than 1% of the critical load function for acidification, therefore consideration of the PEC is needed.

The PECs are greater than 70% of the critical load functions, therefore there is likely to be a significant effect alone, in the context of prevailing environmental conditions, on the interest features of the Minsmere to Walberswick Heaths and Marshes SAC and Minsmere-Walberswick Ramsar. An appropriate assessment of acidification from the routine operation of the installation was therefore required.

The features of the Minsmere-Walberswick SPA are not sensitive to the effects of acidification on their supporting habitat, an assessment was therefore not required.

We used the same methodology for the more distant European sites, assessing emissions and deposition against the relevant critical levels and loads for the designated features.

We concluded that there would also be a likely significant effect on the following European sites:

Outer Thames Estuary SPA

- long-term effects of NOx: the PC was predicted to be >1% critical level (commissioning)

- short-term effects of NOx: the PC was predicted to be >10% critical level (commissioning and routine operation)
- nutrient enrichment: the PC was predicted to be >1% critical load (commissioning and routine operation)
- acidification: the PC was predicted to be >1% for the supporting habitat of the common tern (commissioning and routine operation)

Sandlings SPA

- short-term effects of NOx: the PC was predicted to be >10% critical level (commissioning and routine operation)

Functionally linked land – Sizewell Marshes SSSI and Minsmere-Walberswick SSSI

- short-term effects of NOx: the PC was predicted to be >10% critical level (commissioning and routine operation)
- nutrient enrichment: the PC was predicted to be >1% critical load (commissioning and routine operation)

An appropriate assessment of the effects of a LOOP scenario was carried out on all the relevant sites within 10km of SZC, as no assessment was provided with the permit application.

Appropriate assessment of aerial emissions and deposition

NNB GenCo (SZC)'s assessment of likely significant effect was based on a worst-case conservative scenario. We considered that modelled scenarios with more realistic combinations of generators would better represent the expected commissioning and routine operation of the installation and would better inform the appropriate assessment. Therefore, for features where the need for a detailed assessment was triggered, and in order to carry out a more realistic assessment of the predicted likely significant effects, we served a Schedule 5 Notice on NNB GenCo (SZC) on 21 May 2021 to request further information. The request included the requirement to:

- assess the impacts against daily NO_x critical level for a LOOP event. This had not been included in the original assessment. This was to be carried out for the maximum number of hours a day the generators could be operational
- assess real combinations of generators rather than assuming EDGs are running all the time
- provide information about the typical number of hours a day that the generators could be operational in all operational scenarios, allowing a better understanding of the likelihood of exceedances occurring
- provide some additional information regarding the 'maintenance outages' during routine testing, including information on what these are and how often they are likely to occur
- clarify whether the 24-hour testing of all the generators which occur after a maintenance outage are already included in the annual testing hours

NNB GenCo (SZC) responded on 21 June 2021. The response provided the following additional information on the original and revised modelling approach.

NNB GenCo (SZC) clarified that the routine operation assessment is based on the assumption of one EDG operating continuously throughout the year, with pro-rata emissions based on 720 hours of annual operation. The 12 generators are spread over a relatively large area, with approximately 500m between the most northerly and the most southerly positioned generators. The generators that are closest to a specific receptor will result in the maximum impacts at that receptor, while the generators furthest away will result in lower impacts at the same receptor.

The original air quality modelling assessment reported impacts at each receptor based on the operation of the EDG that resulted in the highest impact at that receptor (that is, the closest EDG, as detailed), rather than considering that the operation of that EDG would only actually be for 60 hours, and operation of EDGs leading to lower results would account for a large proportion of the testing hours.

In addition, in the original assessment, no consideration was given to the fact that the 4 smaller UDGs have much lower emissions of NO_x. Therefore, of the 720 hours of annual operation for the routine testing scenario, 480 hours would be associated with EDG operation, but 240 hours would be associated with UDG operation and therefore would result in considerably lower impacts due to the much lower NO_x emissions of these units.

NNB GenCo (SZC) also clarified that a LOOP event is not intended to occur at all, is statistically unlikely to occur more than once in the plant design life and, in such an event, is likely to last for well under 24 hours. The daily NO_x critical level is also intended to protect habitat sites from concentrations occurring at that level each day, not to qualify a potential single 24-hour event occurring over the entire design life of an operational facility.

We carried out check modelling and sensitivity analysis of the revised modelling and concluded that the daily NO_x PCs predicted to occur during a LOOP event were reasonably representative of a worst-case LOOP scenario occurring during the worst-case 24-hour period of meteorological conditions. We also concluded that the nutrient nitrogen and acid deposition PCs predicted to occur during commissioning and routine testing were reasonably representative.

The appropriate assessment for each relevant European site included carrying out an assessment of the effects of the plan or project on that site's integrity. This final step determined whether, in view of the European site's conservation objectives, it can be ascertained that the permissions 'either alone or in combination with other plans or projects' would not have an adverse effect on the integrity of the site. Where the potential for likely significant effects cannot be excluded, a competent authority must make an appropriate assessment of the implications of the plan or project for that site, in view of the site's conservation objectives. The competent authority may agree to the plan or project only after having ruled out adverse effects on the integrity of the habitats site.

The Managing Natura 2000 sites (Commission Notice C (2018)) advice explains the concept of the 'integrity of the site' at section 4.6.4. In particular, it explains that:

- the expression 'integrity of the site' shows that the focus here is on the specific site. Thus, it is not allowed to destroy a site or part of it on the basis that the

conservation status of the habitat types and species it hosts will anyway remain favorable within the European territory of the Member State
- the integrity "clearly relates to ecological integrity". This can be considered as a quality or condition of being whole or complete. In a dynamic ecological context, it can also be considered as having the sense of resilience and ability to evolve in ways that are favourable to conservation
- the 'integrity of the site' can usefully be defined as the coherent sum of the site's ecological structure, function and ecological processes, across its whole area, which enables it to sustain the habitats, complex of habitats and/or populations of species for which the site is designated
- a site can be described as having a high degree of integrity where the inherent potential for meeting site conservation objectives is realised, the capacity for self-repair and self-renewal under dynamic conditions is maintained, and a minimum of external management support is required

Site integrity can only be considered not to be adversely affected if the findings of an appropriate assessment demonstrate that the conservation objectives will not be undermined alone or in combination with other plans or projects. This would include low-impact effects that are too small or short lived to undermine the achievement of the conservation objectives.

Where it cannot be concluded that the permission will not have an adverse effect on the integrity of a site, the permission should be refused, unless mitigation in the form of restrictions or conditions can be imposed to ensure there is no adverse effect on the integrity of the site(s).

Further guidance and case law relating to concluding HRAs and the integrity test are provided in the legal chapter of the overarching HRA of the Sizewell C project, that is for the water discharge activity, combustion activity and radioactive substances permits.

With regards to the nearest European sites, the Minsmere to Walberswick Heaths and Marshes SAC and Minsmere-Walberswick SPA/Ramsar, a likely significant effect was identified for the following effects, and an appropriate assessment was required both alone and in combination:

- direct toxic effect of NO_x (long-term) – commissioning
- direct toxic effect of NO_x (short-term) – commissioning and routine operation
- nutrient enrichment – commissioning and routine operation
- acidification – commissioning and routine operation (SAC and Ramsar)

An appropriate assessment was also carried out on the LOOP scenario which NNB GenCo (SZC) did not assess as part of the original permit application.

We considered the following relevant conservation objectives when carrying out the appropriate assessment.

For Minsmere to Walberswick Heaths and Marshes SAC, ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the favourable conservation status of its qualifying features, by maintaining or

restoring the extent and distribution of qualifying natural habitats and the structure and function of qualifying natural habitats.

For Minsmere-Walberswick SPA, the objectives are to ensure that, subject to natural change, the integrity of the site is maintained or restored as appropriate, and that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring the extent and distribution of the habitats of the qualifying features and the structure and function of the habitats of the qualifying features.

The Supplementary Advice on Conservation Objectives for Minsmere to Walberswick Heaths and Marshes SAC Minsmere-Walberswick SPA set a target to “restore concentrations and deposition of air pollutants to at or below the site-relevant critical load or level values” as provided on the Air Pollution Information System (APIS).

There are no objectives set for the Minsmere-Walberswick Ramsar. However, the objectives set for the SAC and SPA will be protective of the features of the Ramsar.

Based on our assessment of the information NNB GenCo (SZC) submitted, we do not consider that, for the Minsmere to Walberswick Heaths and Marshes SAC and Minsmere-Walberswick SPA and Minsmere-Walberswick Ramsar the operation of the Sizewell C combustion plant will impact on their ecological structure, function and ecological processes across their whole area.

We were able to reach this conclusion for the long-term emissions of NO_x as the critical level will not be exceeded by the commissioning and operation of the installation.

For the short-term emissions of NO_x, nutrient enrichment and acidification, we were able to reach this conclusion due to the more realistic modelling results confirming that the effects assessed would be low impact, too small, and for the commissioning of the Sizewell C combustion plant too short lived, to prevent achieving the conservation objectives. Site integrity cannot be considered to be adversely affected if the findings of an appropriate assessment demonstrate that the conservation objectives will not be undermined alone or in combination with other PPP.

This conclusion of no adverse effect on site integrity was also reached for the other relevant European sites assessed as part of the appropriate assessment for the installation.

Details of our full appropriate assessment can be found in the document ‘Book 2 Combustion activity HRAR for proposed Sizewell C nuclear power station’

EPR/MP3731AC/A001.

We consulted Natural England on our draft Habitats Regulations assessment and have considered the comments raised in accordance with Regulation 63 of the Conservation of Habitats and Species Regulations 2017 (as amended). We also consulted Natural England on our final Habitats Regulations assessment as part of our public consultation on our proposed permitting decision. As a response to this consultation, Natural England

confirmed that it concurs with our conclusions in the Environment Agency document 'Environmental Permitting (England and Wales) Regulations 2016 (EPR 16): Habitats Regulations Assessment Report' For Sizewell C Operational Permit, dated June 2022, Version: 4.

SSSI assessment

The following Sites of Special Scientific Interest (SSSIs) are located within the screening criteria of 2km of the installation:

- Minsmere-Walberswick Heaths and Marshes SSSI: adjacent – north

The SSSI features were placed into broad habitat groups as used by APIS (accessed 18/08/21) to enable an assessment of the effects of aerial emissions and deposition. Natural England provided the list of notified features on 21 January 2021.

Aggregations of breeding birds:

- avocet (Recurvirostra avosetta)
- bearded tit (Panurus biarmicus)
- bittern (Botaurus stellaris)
- Cetti's warbler (Cettia cetti)
- garganey (Anas querquedula)
- marsh harrier (Circus aeruginosus)

Supralittoral sediment:

- SD1 - Rumex crispus - Glaucium flavum shingle community
- SD2 - Cakile maritima - Honkenya peploides strandline community
- SD6 - Ammophila arenaria mobile dune community
- SD11 - Carex arenaria - Cornicularia aculeata, dune community
- SD12 - Carex arenaria - Festuca ovina - Agrostis capillaris dune grassland

Dwarf shrub heath:

- H1 - Calluna vulgaris - Festuca ovina heath
- H8 - Calluna vulgaris - Ulex gallii heath

Fen, marsh and swamp habitats:

- M22 - Juncus subnodulosus - Cirsium palustre fen meadow (no broad habitat assigned within APIS for acidification, acidity class is acid grassland)
- M23 - Juncus effusus/acutiflorus - Galium palustre rush pasture (no broad habitat assigned within APIS for acidification, acidity class is acid grassland)
- M27 - Filipendula ulmaria - Angelica sylvestris mire (no broad habitat assigned within APIS for acidification, acidity class is acid grassland)
- S2 - Cladium mariscus swamp and sedge-beds
- S26 - Phragmites australis - Urtica dioica tall-herb fen

- S4 - Phragmites australis swamp and reed-beds
- S7 - Carex acutiformis swamp

Littoral sediment:

- SM14 - Atriplex portulacoides saltmarsh
- SM24 - Elytrigia atherica saltmarsh

Acid grassland:

- U1 b,c,d,f - Festuca ovina - Agrostis capillaris - Rumex acetosella grassland

Broadleaved, mixed and yew woodland:

- W6 - Alnus glutinosa - Urtica dioica woodland

Assemblages:

- invertebrate assemblage
- vascular plant assemblage
- variety of breeding bird species (70)
- variety of passage bird species (150)
- variety of wintering bird species (90)

Other habitat features:

- lowland ditch systems
- lowland damp grasslands
- saline coastal lagoons
- sheltered muddy shores (including estuarine muds)
- population of Schedule 8 plant – red-tipped cudweed (Filago lutescens)

The SSSI is vulnerable to the direct effects of toxic contamination, nutrient enrichment and acidification.

- Sizewell Marshes: adjacent – west

The SSSI features have been placed into broad habitat groups as used by APIS (accessed 18/08/21) to enable an assessment of the effects of aerial emissions and deposition. Natural England provided the list of notified features on 21 January 2021.

Fen, marsh and swamp habitats:

- M22 - Juncus subnodulosus - Cirsium palustre fen meadow
- M23 - Juncus effusus/acutiflorus - Galium palustre rush-pasture
- S26 - Phragmites australis - Urtica dioica tall-herb fen

Assemblages:

- vascular plant assemblage
- assemblages of breeding birds – lowland damp grasslands

- invertebrate assemblage

Other habitat features:

- lowland ditch systems

The SSSI is vulnerable to the direct effects of toxic contamination, nutrient enrichment and acidification.

- Leiston-Aldeburgh: 1.7km south

The SSSI features have been placed into broad habitat groups as used by APIS (accessed 18/08/21) to enable an assessment of the effects of aerial emissions and deposition. Natural England provided the list of notified features on 21 January 2021.

Aggregations of breeding birds:

- gadwall (Anas strepera)
- marsh harrier (Circus aeruginosus)
- woodlark (Lullula arborea)
- gadwall (Anas strepera)
- shoveler (Anas clypeata)
- white-fronted goose (Anser albifrons albifrons)

Heathland habitats:

- H1 - Calluna vulgaris - Festuca ovina heath

Fen, marsh and swamp habitats:

- S4 - Phragmites australis swamp and reed-beds

Supralittoral sediment:

- SD1 - Rumex crispus - Glaucium flavum shingle community

Acid grassland habitats:

- U1 b,c,d,f - Festuca ovina - Agrostis capillaris - Rumex acetosella grassland

Woodland habitats:

- W1 - Salix cinerea - Galium palustre woodland
- W2 - Salix cinerea - Betula pubescens - Phragmites australis woodland
- W6 - Alnus glutinosa - Urtica dioica woodland

Assemblages:

- vascular plant assemblage
- outstanding dragonfly assemblage
- variety of breeding bird species (70)

Other habitat features:

- lowland ditch systems
- lowland damp grasslands and lowland open waters and their margins

The SSSI is vulnerable to the direct effects of toxic contamination, nutrient enrichment and acidification.

The assessment for the Minsmere-Walberswick Heaths and Marshes, Sizewell Marshes and Leiston-Aldeburgh SSSIs followed the same methodology as that outlined for the European sites. We have reviewed NNB GenCo (SZC)'s assessment of SSSIs and agree with the assessment's conclusions that the proposal is not likely to damage the special features of the SSSIs.

Assessment of non-statutory sites

The following non-statutory local wildlife and conservation sites are located within 2km of the installation:

- Aldringham to Aldeburgh disused railway line
- Leiston Common
- Dower House
- Suffolk Shingle Beaches
- Reckham Pitts Wood
- Sizewell Levels and associated areas
- Southern Minsmere Levels

NNB GenCo (SZC)'s assessment for the non-statutory sites is consistent with the Habitats Regulations assessments detailed here. We have reviewed NNB GenCo (SZC)'s assessment and agree with the assessment's conclusions that there is no significant pollution in relation to these sites.

Assessment of disturbance impact (Noise)

NNB GenCo (SZC)'s noise impact assessment (Appendix E of the combustion activity submission Sizewell C) and section 5.2 of the shadow HRA (Appendix D of the combustion activity submission Sizewell C) set out the operator's methodology used for the assessment of disturbance to protected bird species from noise.

We have audited NNB GenCo (SZC)'s modelling scenarios and can agree with the conclusions.

The distance screening criteria applied to the assessment of the effects of combustion activities on sensitive qualifying features of European sites is 10km. This distance has also been applied to screen for the effects of noise on bird qualifying features of relevant SPA and Ramsar sites. For disturbance, a likely significant effect will be presumed where noise levels are modelled to be above background levels within the European sites.

NNB GenCo (SZC) considers that noise from the diesel generators is not expected to have an impact on the bird features of the Minsmere-Walberswick SPA and Ramsar and Outer Thames Estuary SPA in the long term due to their intermittent operation and

location within concrete buildings. This conclusion is also reached for the other relevant European sites assessed for the installation.

NNB GenCo (SZC)'s modelling has predicted a worst-case sound level of 45dB resulting from a LOOP event. Background levels of 48dB (day) and 43dB (night) were measured at Minsmere-Walberswick SPA and Ramsar and the Outer Thames Estuary SPA. Therefore, the worst-case noise levels are expected to be consistent with background levels experienced at the site.

NNB GenCo (SZC) concluded in the shadow HRA that a likely significant effect can be excluded for potential noise effects in all cases due to the minimal predicted change relative to ambient noise levels.

We accept NNB GenCo (SZC)'s conclusions and agree that noise, either prolonged or intermittent, will not result in a likely significant effect on the designated bird populations alone or in combination at Minsmere-Walberswick SPA and Ramsar and Outer Thames Estuary SPA, from noise generated during the commissioning and routine operation of EDGs and UDGs, and a LOOP scenario.

Our full assessment under the Habitats Regulations can be found in the document 'Book 2 Combustion activity HRAR for proposed Sizewell C nuclear power station' EPR/MP3731AC/A001.

4.6 Emission limits and monitoring

NNB GenCo (SZC) acknowledges that Sizewell C emergency backup generators are defined as medium combustion plants, but states in the Schedule 5 Notice response (BAT and CBA Assessment, June 2021) that the generators do not fall under the scope of the Medium Combustion Plant Directive (MCPD) as the emission limit values are not applicable to combustion plant that operates for less than 500 hours a year. However, we consider these generators do fall under the MCPD but that they may be exempted (as opposed to excluded) from compliance with the emission limit values set out in Part 2 of Annex II based on the limited annual operational hours (less than 500 hours a year), as a rolling average over a period of 3 years. We have decided that this exemption is applicable to SZC combustion plant, and therefore no emission limits are set in Table S3.1 of the permit.

NNB GenCo (SZC) also considers that due to a defined nuclear safety role, the generators are 'excluded generators' as defined in Schedule 25B of the Environmental Permitting (England and Wales) Regulations 2016 (as amended). However, this is not correct, in our view, as the Sizewell C generators do not fall under the Schedule 25B (specified generators) of the EPR. We consider that the SZC generators are subject to provisions of Chapter II of IED and do not come within Schedule 25B of the EPR.

NNB GenCo SZC's Air Quality Modelling Assessment uses a maximum of 720 operating hours a year for routine testing as a worst-case assessment, but NNB GenCo (SZC) has confirmed that the operating hours will, in fact, be significantly less and most likely below the 500 hours threshold set out in the MCPD.

For the commissioning phase (the first 2 years to bring the generators into operation), the Air Quality Modelling Assessment uses a maximum of 2,446 hours a year as a worst-case assessment. However, the actual hours are likely to be less and there may be scope for more testing to take place at the manufacturers' site. We requested further information about the actual commissioning hours, and justification for the required hours. NNB GenCo (SZC) is not able to provide us with more information about the actual commissioning hours as it does not currently have more information available. However, it explained in more detail why the generators are required to be operated within the proposed hours during the commissioning. In an email dated 24 March 2022, NNB GenCo (SZC) explained that the testing and commissioning activities of the diesel generators are an essential part of the overall project. The diesel generator systems and sub-systems must work together. The tests begin with installation/equipment checks, progressing into integration of elementary functions testing, followed by overall sequence testing.

The commissioning programme allows the integration of the diesel generators in a safe and efficient way in accordance with the contractual requirements and regulations. The strategy of the commissioning programme is to provide a smooth and efficient transfer of the diesel generator systems from their construction to their commissioning. The commissioning programme is only considered final once all of the system and sub-systems are checked and in compliance with the design requirements.

There is also a link between the commissioning programme of the diesel generators and the nuclear power station. The commissioning tests described above for the diesel generators can be done independently. However, after this step, the diesel generators and the plant are also tested in case of on-site or off-site electrical power loss (LOOP) to the nuclear power plant. The objective of the LOOP tests is to validate the electrical transients (bursts of energy) generated by these switchovers, check the electrical behaviour of the nuclear power plant and the recovery of the safety functions necessary to reach a safe and stable state. In addition, the diesel generators are also required to be available for fuelling the reactor and for sensitive phases, including hydraulic pressure tests of the primary circuit.

We have included condition 2.3.5 in the permit, which states 'The activities shall not operate for more than 500 hours per annum'. This condition restricts the hours of operation as we have not set emission limits in the permit. We acknowledge that the safe commissioning and operation of the emergency standby generators may require over 500 hours of annual operation, as explained above. However, as has been demonstrated in the application, exceedances of the relevant air quality objectives and environmental assessment levels are unlikely in all operational scenarios. Furthermore, we have reached the conclusion that the operation of the installation will have no adverse effect on the integrity of relevant European sites, and will not damage the special features of relevant SSSIs.

Nuclear safety is of course paramount and therefore we have decided to take a balanced approach. This means that in the event that the generators are required to be operated for more than 500 hours, we may consider adopting a local enforcement position (LEP), which we estimate will take place nearer the time of the commissioning of the installation. The

LEP, if adopted, will set out in more detail the conditions under which the commissioning of the installation may take place, particularly in relation to the hours needed to commission the generators.

As explained in section 4.7.4 of this decision document, at present, there are no other diesel generators that are safety qualified for use on the UK EPR™ within the UK's regulatory environment. However, as the operation of the plant is not planned until the mid-2030s, we have also included a pre-operational condition PO5 in the permit that requires the operator to further review the availability of any suitable generators that achieve lower emissions than proposed in the application, including a review of the feasibility of fitting selective catalytic reduction to the generators, nearer to commissioning. This will ensure that the best available generators will be installed, therefore ensuring that the emissions to air are minimised.

NNB GenCo (SZC) will be required to record operating hours for each generator and the number of runs for each of the generators. Furthermore, NNB GenCo (SZC) will also ensure that standby generators are well maintained in line with the operating techniques submitted in its application, in order to minimise the likelihood of impact from air pollutants.

We have incorporated the air quality parameters from Table 3-1: Emission inventory of Sizewell C's Combustion activity impact assessment for air emissions, Doc. Ref. 100207663 Rev 01, Jan 2020 in the operating techniques Table S1.2 of the permit to secure emission impacts. We have also incorporated Table 4.1 of Air Quality Assessment, dated 21 June 2021 in the operating techniques, confirming the predicted operational hours to ensure that maintenance and testing is limited to as few hours as possible for each generator.

We have assessed NNB GenCo (SZC)'s proposals for monitoring, and conclude that they represent BAT for monitoring in accordance with our guidance. We have decided that monitoring should be carried out for the parameters listed in Table S3.1 of the permit, using the methods detailed and to the frequencies specified. In particular, we have specified annual monitoring of emissions of carbon monoxide from emission points A1 to A12. This monitoring has been included in the permit in order to comply with the requirements of the Medium Combustion Plant Directive, which specifies the minimum requirements for monitoring of carbon monoxide emissions, regardless of the reduced operating hours of the plant.

We have also specified monitoring of emissions of nitrogen oxides and particulates from emission points A1 to A12, with the same frequency specified for the monitoring of carbon monoxide emissions. In setting out this requirement, we have applied our regulatory discretion, as we consider that this monitoring, to happen in concurrence with the carbon monoxide monitoring, is proportionate to the risk associated with the emissions of NOx and particulates from the installation.

In accordance with NNB GenCo (SZC)'s proposal, the monitoring shall be carried out in line with our web guide Monitoring stack emissions: techniques and standards for periodic monitoring (Environment Agency, 2021a).

Based on the information in the application, we are satisfied that the operator's techniques, personnel and equipment have either MCERTS certification or MCERTS accreditation as appropriate. MCERTS is our monitoring certification scheme and it provides the framework for businesses to meet our quality requirements. If an operator complies with MCERTS, we have confidence in the monitoring of emissions to the environment.

To ensure that the air emissions monitoring locations meet the requirements of BS EN 15259 and the supporting Method Implementation Document (MID), we have set an improvement condition IC4 in the permit that requires the operator to carry out tests during the commissioning and report to us on the findings.

We have set a requirement for the first monitoring to happen within 4 months of the issue date of the permit or the date when each new medium combustion plant is first put into operation, whichever is later.

4.7 Application of best available techniques

4.7.1 Scope of consideration

In this section, we explain how we have determined whether NNB GenCo (SZC)'s proposals are the best available techniques (BAT) for this installation.

- The first issue we address is the fundamental choice of electrical generation technology. There are a number of alternatives, and NNB GenCo (SZC) has explained why it has chosen one particular kind for this installation.
- We then consider, in particular, control measures for the emissions which were not screened out as insignificant in the previous section on minimising the installation's environmental impact.
- We also have to consider the combustion efficiency and energy utilisation of different design options for the installation, which are relevant considerations in determining BAT for the installation.

4.7.2 Choice of technology

NNB GenCo (SZC) compared 3 options for the technology to supply an independent emergency electricity supply to Sizewell C power station:

- option 1 – diesel generators run on fuel oil
- option 2 – gas turbines run on fuel oil
- option 3 – gas turbines run on gas

The first screening ruled out option 3, as it did not fulfil the requirement for independent operation, as the gas would have to be piped in and would be dependent on the national gas distribution network.

NNB GenCo (SZC) compared options 1 and 2 further using criteria from the Institute of Electrical and Electronics Engineers' (IEEE) standard. The assessment showed that both options were equally matched in most areas and the majority of the differences were found under criteria of relatively low importance. However, the diesel generator performed better than the gas turbine in one particularly important area; fast start-up.

Fast start-up is a fundamental requirement of the technology as it is essential to resume, almost instantaneously, a supply of electricity to essential systems in the event of loss of power to the site. This is why diesel generators are the preferred option in the design of pressurised water reactors around the world, resulting in improved environmental and safety performance associated with a wide pool of operational experience and optimised staff management.

NNB GenCo (SZC) concluded that option 1, is considered to be the best technology and should be used to provide the emergency electricity supply to the essential systems for the Sizewell C power station.

It should be emphasised that:

- the choice of diesel generators rather than gas fired engines, for the reactor emergency power supply, is considered to be BAT, with regards to safety aspects and based on the operational experience feedback available on the fleet of French nuclear power stations, which has shown that this equipment is highly reliable and well tested
- essential diesel generators (EDGs) can be started from cold very quickly (in less than 30 seconds). This is vital given their role on the site
- gas turbines are more expensive to purchase than the equivalent size diesel generator due to the high spinning speeds and temperatures they operate at, however this is balanced by lower operating expenditure, so there is little difference in cost
- safety case requires EDGs and ultimate diesel generators (UDGs) to be of diversified technologies (different types of diesel generators will be used)
- the decision to use EDGs is part of the reference design in GDA and safety assessments carried out for the EPR

In addition to this, EDF Energy and the wider EDF Group of companies have extensive experience in successfully maintaining and operating EDGs on sites across the UK as well as in support of 58 nuclear reactors in France. They have also provided engineering expertise to the nuclear sector across Asia and the United States of America.

4.7.3 Choice of fuel and emissions control

As part of the development process, NNB GenCo (SZC) has considered suitable fuels for the provision of emergency power. A range of considerations are discussed here. As each plant will only be operated (under normal operations) for maintenance purposes and during periodic nuclear safety tests, the storage of the fuel is an important aspect in decision-making.

Reciprocating engines can be operated on diesel (typically C14H30) or a short-chain hydrocarbon such as kerosene or petroleum (typically C9H20). There are 2 main reasons why diesel is the preferred fuel choice:

- Diesel is a long-chain hydrocarbon which has a greater energy to volume ratio. This means that slightly lower volumes need to be stored.
- The long-chain hydrocarbons evaporate more slowly than short-chain hydrocarbons, resulting in a smaller release of fugitive loss to the environment from the storage tanks.

Both of these aspects are important decision-making factors where larger volumes of fuel are stored for standby use.

For large combustion plant, the techniques for controlling releases of NO_X, carbon monoxide and particulates (particulate matter (PM)) are based on burner design, the method of atomisation and the control of primary, secondary and tertiary air. A control loop system is required to govern the air and fuel supply, and is significant in air pollution control.

These techniques are not appropriate for small/medium installations using compact, high thermal rating compression ignition engines, as there are no burners. Particulate matter (PM) can be reduced by removing solids from the fuel. This is not considered practicable for a standby system where the benefits from minimal use outweigh the installation and maintenance costs. Additional plant equipment also increases the chances of plant failure, which could impact on reliability.

NO_X is mostly formed from oxidation of nitrogen in the combustion air. NNB GenCo (SZC) has committed to optimising NO_X control at the procurement phase by considering the design specifications. It is noted that these considerations will address equipment reliability as this is the priority for standby safety related diesel generators. NO_X control will also be addressed via a maintenance programme to ensure diesel generator performance is optimised.

NNB GenCo (SZC) assessed end-of-pipe flue gas technologies such as selective catalytic reduction (SCR) and selective non-catalytic reduction (SNCR) to reduce NO_x emissions. The conclusion was that as these technologies require steady operating conditions to function effectively, they are not a practical cost-effective consideration for applications of this type where the plant is only operated infrequently. We agree with NNB GenCo (SZC)'s assessment of secondary abatement measures for the diesel generators.

The source of sulphur, in emissions to air from combustion processes, is the fuel. Oil, including bitumen, emulsions and many heavy fuel oils have high sulphur contents. Using fuel oils containing sulphur will result in some sulphur dioxide (SO_2) releases, as well as sulphur trioxide. However, the permit requires low sulphur oils (below 0.1% w/w sulphur) to be used. This precludes the need for any form of flue gas desulphurisation (FGD). As stated, the maximum sulphur content of fuel oil and therefore emissions of sulphur dioxide are controlled by the Sulphur Content of Liquid Fuels (SCOLF) Regulations, and no monitoring or emission limit values (ELVs) are proposed for this pollutant.

For safety reasons, there should be different sources of fuel supply. This will not have any effect on the sulphur content of the diesel fuel used, as all suppliers will be required to provide low sulphur diesel to minimise SO_2 emissions.

NNB GenCo (SZC) has carried out a load test at Hinkley Point C (HPC) EDGs using ultra-low sulphur gas oil (below 0.001% w/w sulphur) successfully, but further testing is required before the operator can confirm that both EDGs and UDGs can be run on ultra-low sulphur gas oil. We have set a pre-operational condition PO4 in the permit that requires NNB GenCo (SZC) to review and update its air quality management plan, including possibly using ultra-low sulphur gas oil before the commissioning of the plant.

We have reviewed NNB GenCo (SZC)'s choice of technology and agree in principle that the proposed equipment represents BAT for the installation. However, the operator was required to carry out a further BAT assessment of chosen diesel generators because the proposed generators did not meet the latest emissions standards for standby plant. This is considered in more detail in section 4.7.4.

4.7.4 Diesel generator specification

For new standby plant, such as emergency diesel generators, we consider BAT to be the use of generators that can meet the latest emission standards. The latest standards are equivalent or better than 'TA-Luft 2g' or Tier II USEPA with emissions of 2,000mg/m^3 for NO_x; 650mg/m^3 for CO, 130mg/m^3 for particulates and dust and 150mg/m^3 for hydrocarbons as introduced in our draft Data Centre FAQ guidance (Environment Agency, 2020).

NNB GenCo (SZC)'s application states that emissions from the EDGs and UDGs are below the TA-Luft 2g Standards for CO, PM and SO_2, however, they exceed the NO_x limit. Unlike other standby generators, the safety classified EDGs and UDGs will be required to meet stringent nuclear safety requirements. Therefore, NNB GenCo (SZC) considers that these emission standards are not considered relevant to the nuclear qualified EDGs and UDGs. Furthermore, the cost to classify an alternative diesel generator with reduced NO_x emissions would be grossly disproportionate to the benefit in NNB GenCo (SZC)'s view.

We acknowledge the requirement for the engines to meet the stringent nuclear safety requirements, but BAT is to prevent and minimise emissions as far as is practicable, and use the best available technology.

Therefore, we requested, through a Schedule 5 Notice on 21 May 2021, that NNB GenCo (SZC) provided a detailed BAT cost benefit justification on classifying an alternative diesel generator with the latest emissions standards. This was to consider the reduction on emissions and their impact, and the feasibility and cost of the safety qualifying an alternative diesel generator. NNB GenCo (SZC) was also required to carry out a search for alternative cleaner generators that meet the nuclear safety requirements. This was to include the availability of any suitable diesel generators that achieve better environmental standards than those proposed in the application.

NNB GenCo (SZC) carried out a BAT assessment and cost benefit analysis in order to identify BAT for the combustion activities at the SZC site, in terms of the benefits of reduced oxides of nitrogen emissions associated with generators that could meet the TA

Luft 2g standard, against the costs of qualifying replacement units to be approved for use in a nuclear safety case.

For the purpose of the assessment, NNB GenCo (SZC) considered 2 options for the diesel generators for the SZC site. These are:

option 1: proposed diesel generators – NO_x emissions in excess of the TA Luft 2g standard

option 2: diesel generators with NOx emissions at the TA Luft 2g standard

Firstly, NNB GenCo (SZC)'s assessment describes the processes that are required to be followed before licensing and instalment of any new nuclear power station designs.

Generic design assessment (GDA) is the process the nuclear regulators (Office for Nuclear Regulation (ONR) and the Environment Agency) use to assess the safety, security and environmental elements of new reactor design early in the design development for a generic site, prior to any site-specific planning, licensing or permit application. The process can take a number of years to complete. The process of GDA approval for the UK EPR™ planned for installation at Hinkley power station (HPC) and Sizewell C (SZC) began in 2007.

Diesel generators are required to be 'nuclear classified' for use on the UK EPR™ at SZC. Given their important safety role in the safe shutdown of a nuclear power station, in the event of an emergency situation, they must be compliant with a rigorous subset of requirements. Nuclear classification requires any equipment or systems within a nuclear facility that fulfil a nuclear safety function to be suitably and sufficiently assessed to prove that they will fulfil this function when required. In the UK, this process is provided via a process of equipment qualification (EQ), which is a fundamental requirement of the UK's approach to safety assessment for nuclear facilities and differs from other international approaches. The difference is that the UK's qualification processes are goal based, where nuclear operators will need to demonstrate that their components and systems will operate safely as intended, not just that they meet the prescribed International Atomic Energy Agency (IAEA) standards. This difference means that any proposed changes to the qualification testing of all safety related systems (SRS) and safety related instrumentation (SRI) will require a full repeat of all aspects of the EQ process. This therefore means that diesel generators that have been approved for use, for example in France, would not be directly available for use in the UK without going through the full EQ process, therefore incurring the additional cost of this process.

The diesel generators for the HPC UK EPR™ have undergone EQ stages 1 to 3, with elements of item 4 commencing as the diesel generators are in the process of being constructed at the site. This process has therefore 'approved' the SRS and SRI for use on both the HPC and SZC UK EPR™, up to EQ stage 3. At present, there are no other diesel generators that are SRS or SRI approved for use on the UK EPR™ within the UK's regulatory environment, given that the GDA and site pre-construction safety report (PCSR) approval process for the UK EPR™ specifically covers the plant proposed for HPC and SZC only.

As an important safety element, any change to the diesel generators, their associated equipment or their building housing would potentially require category 1 or higher category

2 nuclear safety changes. This would therefore be likely to result in major disruption to the SZC schedule and substantial additional project costs.

NNB GenCo (SZC) estimates that the cost of the design and qualification activities contract for all the HPC diesel generators is more than £63 million. Therefore, if required again for the SZC site, the majority of these costs would apply again, and the process would result in a significant delay for the redevelopment and then for requalification.

Beside the diesel generators there are sub systems that must be qualified for continued functionality following extreme events. These systems have additional requirements for nuclear installations, particularly the requirement for SMART devices (sensors, programmable logic controller (PLC), controllers, logic, instrumentation), which need to be proven to be safe, secure and reliable above and beyond what is required for any other purpose the diesel generators may be used for. Any changes to the PLCs on the diesel generators would need to be reapproved for nuclear safety, unless the manufacturer is using one already approved, and any software would need to be fully tested and approved, adding additional time and cost.

The proposed diesel generators will be housed within bespoke buildings. The current diesel generator building layouts are densely packed, with very little room for equipment modification. They also need to allow enough space to maintain the diesel generators; this could include full removal and replacement.

At present, the site layout currently allows enough space. However, with alternative generators there may not be adequate room without repositioning other onsite buildings. In addition, there is limited space within the current HPC UK EPR™ plot plan, which is being replicated for the SZC design. The areas where the diesel building can be moved are very limited as the diesel generators need to be as close as possible to the turbines and as far as possible from internal and/or external hazards.

If there were any changes to the diesel generators and their bespoke buildings, it would then require a full structural and architectural redesign to accommodate the alternatives, which would impact on the structural and seismic design of the buildings. It is considered that this would impact on contracts, the schedule, and the plot plan as well as the cost and difficulty of the redesign and the relevant nuclear safety approvals. Based on costings that were produced as part of the UK EPR HPC™, NNB GenCo (SZC) estimates that a redesign of the diesel generator buildings could result in additional costs in excess of £120 million.

Any changes to the building designs and layouts that impact the external features of the facility will also have an impact on the Development Consent Order (DCO) application, potentially resulting in a DCO variation (change) request, which brings with it project delays and increased risks associated with challenge and potentially rejection.

Given the costs and timescales involved in the diesel generator qualification process, as outlined, the diesel generators selected for the SZC site are based on a full replication of the design currently under construction for HPC.

This enables the SZC site to maximise the opportunity to derive value from a ‘Second of a Kind’ (SOAK) development, reusing the detailed design and adopting a systematic approach to capturing, quantifying and applying lessons learned. These benefits are not

only applicable for the design phase, but will continue to be realised throughout construction, commissioning, operation and decommissioning phases.

In order to realise the benefits of being a SOAK development, all equipment provided for the SZC site has been planned to be an exact replication of the equipment that will be manufactured for HPC. It means that the engineering design works and equipment qualification work will be re-used on SZC and, as a result, a high level of cost savings and reduction of the risk on these activities are expected.

Replication of the safety case requirements and as low as reasonably practicable (ALARP) conclusions that apply for HPC are applicable by default to SZC. NNB GenCo (SZC) states that this is particularly important in relation to the diesel generators which are required to be safety classified systems and have been selected to ensure that they (and all their associated equipment) can meet the probability of failure on demand/reliability rates rather than bespoke systems that have not been previously substantiated or proven to meet the required strict safety requirements.

NNB GenCo (SZC) states that it is difficult to estimate the potential costs involved should alternative diesel generators be required for the SZC site, given the complexity of the design and qualification process, the potential for category 1 or high category 2 nuclear safety changes, and the conclusions that risks are ALARP for alternative diesel generators. However, NNB GenCo (SZC) considers, as a conservative assumption on the cost savings involved, that if replication for the diesel generators is achieved on SZC, savings of between £39 and £45 million are expected compared to the HPC actual costs of more than £63 million.

Furthermore, NNB GenCo (SZC) states that this cost saving is conservative as it is only concerned with the design and qualification process of the diesel generators themselves.

It does not take into account:

- redesign of the diesel generator buildings
- redesign of the site layout
- redesign of the site electrical distribution network
- revisions to relevant nuclear safety approvals
- variations to the DCO resulting from potential changes to the site layout

As such, requiring alternative diesel generators to be used, NNB GenCo (SZC) estimates that it could cost up to £200 million, and therefore would potentially make the whole SZC project unviable as it would no longer provide the benefits of being a SOAK project.

NNB GenCo (SZC)’s assessment gives an initial basic evaluation of the available options, costs and feasibility. However, the assessment needs to determine whether the reduced emissions achieved by option 2 outweigh the costs associated with qualifying alternative diesel generators.

The annual average NO_x emissions for the proposed diesel generators are 1,918mg/Nm$^{3(1}$ for the EDGs and 1,143mg/Nm$^{3(1}$ for the UDGs, and therefore are not compliant with the TA Luft 2g (750mg/Nm$^{3(1}$) standard. Testing of the proposed diesel generators on the Hinkley Point C site has indicated that the actual emissions from the UDGs are likely to be lower than those indicated, although they are still in excess of the TA Luft 2g standard.

For the proposed diesel generators, annual NO_x releases of up to 130 tonnes per year for 2 years during the commissioning phase and 57 tonnes per year during the operational phase of the SZC site are expected. Over a 60-year lifetime, the total NO_x emissions are estimated to be in the region of 3,548 tonnes.

For the alternative diesel generators with TA Luft 2g standard, annual NO_x releases of up to 57 tonnes per year for 2 years during the commissioning phase and 23 tonnes per year during the operational phase of the SZC site are expected. This more than halves the annual mass emission of NO_x from the site over option 1. Over a 60-year lifetime, the total NO_x release from the alternative diesel generators would be 1,457 tonnes, a reduction of 2,092 tonnes over the proposed diesel generators.

The Department for Environment, Food and Rural Affairs (Defra) has developed ‘damage costs’ to enable proportionate analysis when assessing relative impacts on air quality. Damage costs are a set of impact values, measured per tonne of emission of different pollutants, which estimates the societal costs associated with changes in pollutant emissions.

The damage costs that have been applied to the NO_x emissions have been derived from the Defra Air Quality Appraisal: Damage Cost Guidance. The guidance details relevant damage costs based on the sector, the source of the emission and the location. A value of £1,633 per tonne of NO_x has been chosen, which equates to £5,793,340 damage costs to the proposed diesel generators when 3,548 tonnes of NO_x are being released over the 60-year lifetime. For the alternative diesel generators, the total damage costs of 1,457 tonnes of NO_x being released would be £2,378,181. This therefore represents a difference of £3,415,160 in the damage costs between the 2 options.

An assessment of the costs associated with each of the options using a discounted cash flow (DCF) analysis technique is the recommended assessment method for considering BAT. A DCF has been prepared using the Environment Agency’s Industrial Emissions Directive cost-benefit analysis (IED CBA) tool. The CBA tool used for the assessment was obtained from gov.uk and is the BETA version of the tool, which was updated in May 2020 with the revised air quality damage costs.

The various aspects taken into consideration for the analysis are:

- costs for requalification of alternative diesel generators

[1] 0°C, 15% O_2, 101.3 kPa and dry

- emissions of NO_x

The period of assessment has been assumed to be 60 years, reflecting the planned lifetime of the diesel generators.

The CBA output demonstrates that option 2 results in a disproportionate cost of nearly £64 million when considering the environmental benefit gained from NO_x removal achieved over option 1. This is due to the costs associated with qualifying alternate plant, and the relatively low annual mass emissions from the diesel generators overall, given the low number of operational hours proposed. Based on NNB GenCo (SZC)'s assessment, it can therefore be demonstrated that option 1 (proposed diesel generators) represents the preferred option, despite the higher potential NO_x release, against the implementation of option 2 which would achieve the TA Luft 2g standard. If the actual costs of alternative diesel generators are higher, as anticipated, this conclusion is strengthened further.

We have reviewed NNB GenCo (SZC)'s BAT assessment. We do not consider the CBA is an appropriate tool for assessing damage costs for short-term NO_x emissions, but have considered the quantitative costs analysis presented within the operator's assessment.

We agree with NNB GenCo (SZC)'s conclusions that option 2 (alternative diesel generators that could achieve the TA Luft 2g standard) shows a disproportionate cost when particularly considering the additional capital expenditure (CAPEX) involved with the redesign and safety qualification process that would be required to replace the proposed diesel generators. We also acknowledge the time implications on the wider project of safety qualifying an alternative engine, and difficulties of purchasing alternative engines from other countries due to differences in safety requirements and qualifications.

Based on our audit of the NNB GenCo (SZC)'s air quality modelling assessment, we are satisfied that with both options the likelihood of breaches of NO_x emissions against air quality standards (AQSs) is low at all receptors in all operating scenarios. Although the alternative lower emission diesel generators may reduce impacts at habitat and conservation sites, they may still result in potential exceedances of the daily critical level. There is therefore no change in conclusions on the significance of any air quality effect as a result of the use of TA Luft 2g compliant diesel generators.

Having assessed all the information provided to us, and particularly considered the fact that the diesel generators have a defined critical safety role in the safe shutdown of a nuclear power station in the event of an emergency situation, we have determined that the proposed diesel generators are exempted from the requirement to meet with the latest emission standards based on their limited annual operational hours (see section 4.6 for further details). We consider that the proposed generators taken as a whole currently represent BAT for the installation (however, see paragraph below). We are satisfied that the operation of the diesel generators is unlikely to exceed any of the air quality standards in any of the operating scenarios. In addition, NNB GenCo (SZC) is required to operate the plant in accordance with the air quality management plan that is incorporated into the permit in Table S1.2. This plan includes operational measures that will reduce the potential impact of air emissions, such as timing and distribution of testing hours. We have also included a pre-operational condition PO4 in the permit that requires the operator to review and update the air quality management plan nearer the time of commissioning. This is

because, currently, NNB GenCo (SZC) has not finalised the plant's commissioning or routine testing programmes.

As the operation of the plant is not planned until the mid-2030s, we have also included a pre-operational condition PO5 in the permit that requires the operator to review the availability of any suitable generators that achieve lower emissions than the generators proposed in the application, including a review of the feasibility of fitting selective catalytic reduction to the generators, nearer the time of commissioning. This will ensure that the best available generators will be installed, therefore ensuring that the emissions to air are minimised.

4.7.5 Energy efficiency

We have considered the issue of energy efficiency in the following ways:

- The use of energy within and generated by the installation, which are normal aspects of all EPR permit determinations. This issue is dealt with in this section.
- The combustion efficiency and energy utilisation of different design options for the installation are relevant considerations in determining BAT for the installation. This aspect is covered in the BAT assessment in section 4.7.2 of this decision document.

Having considered the information submitted in the application, we are satisfied that appropriate measures will be in place to ensure that energy is used efficiently within the installation.

The application states that the specific energy consumption (SEC), a measure of total energy consumed per unit of output is of limited importance for standby plant, as efficiency is a secondary measure to reliability/availability, and under normal operations, plant will only be operated for maintenance purposes and during periodic testing. In addition, the plant is only operated at its optimum state for short periods before being shut down.

We accept that due to the operational regime of the generators SEC is not an appropriate measure for the installation.

The installation will generate electricity only and has been specified to maximise electrical output with little or no use of waste heat. All the electricity generated from loaded test runs will be exported to the grid with that generated by the reactor. Electricity produced at the installation can only be exported to the National Grid when the emergency generators are operated for testing and commissioning purposes. Elective operation of the emergency generators to provide balancing services or demand side response services is not permitted.

The operator is required to report with respect to electricity export under condition 4.2 and Schedule 4 of the permit.

Permit condition 1.2.1 requires the operator to use energy efficiently.

There are no site-specific considerations that require the imposition of standards beyond indicative BAT, and so we accept that NNB GenCo (SZC)'s proposals represent BAT for this installation.

4.8 Other statutory considerations

EA 95 – Section 4: Principal aim of the Environment Agency ('sustainable development')

We are required to contribute towards achieving sustainable development, as considered appropriate by the ministers and set out in guidance issued to us. 'The Environment Agency's Objectives and Contribution to Sustainable Development: Statutory Guidance' (issued by Defra in December 2002) provides guidance to us on such matters as the formulation of approaches that we should take to our work, decisions about our priorities and our allocation of resources. It is not directly applicable to our individual regulatory decisions.

The statutory guidance states that our main contribution to sustainable development will be to meet our various objectives in a way that takes account (subject to and in accordance with EA 95 and any other enactment) of economic and social considerations.

We consider that the overall approach described in this document and, in particular, the application of BAT, which takes into consideration social and economic factors, and the assessment of the impact of the discharges on members of the public and the environment, contribute appropriately to the aim of achieving sustainable development, having regard to the statutory guidance.

EA95: Pollution control powers

Section 5 of EA 95 sets out the purpose for which our pollution control powers, including our powers under EPR 16, must be used. This is for 'preventing or minimising, or remedying or mitigating the effects of, pollution of the environment'. We consider that we have properly used our pollution control powers for that purpose, in that:

- we have set limits and conditions based on BAT, as specified in the statutory guidance, and having regard to government policy
- the impact of the permitted discharges on members of the public is as low as reasonably achievable (ALARA)
- the environment is protected

EA95, Section 7(1)l(ii): Amenity issues

Under section 7(1)l(ii) of EA 95, we must take into account any effect which the proposals may have on the amenity of any rural or urban area. Our assessment of the impact from the proposal is that there are no effects that would require us to include additional limits or conditions in the permit.

We are satisfied that our decision to permit the combustion activity, in accordance with legal and policy requirements, will not lead to any harmful effects on local amenities.

EA95, Section 7(1)I(iii): Well-being of local communities

Under section 7(1)I(iii) of EA 95, we must have regard to the effect our proposals may have on the economic and social well-being of local communities in rural areas.

We have considered, as appropriate, the potential effect on the economic and social well-being of the local community as part of:

- our assessment of NNB GenCo (SZC)'s proposals in relation to the use of BAT, which involves considering costs and benefits
- our considerations in relation to our principal aim (sustainable development)

Our assessment of the impact from the proposal is that there are no effects that would require us to include additional limits or conditions in the permit.

EA 95, Section 39: Likely costs and benefits

We have a duty to take into account the likely costs and benefits of whether and how we exercise our powers ('costs' being defined as including costs to the environment as well as to any person). This duty, however, does not affect our obligation to discharge any duties imposed upon us in other legislative provisions.

We have taken into account the likely costs and benefits in our assessment of BAT. We are satisfied that the conditions in the permit are proportionate.

Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 – Groundwater Directive (Schedule 22 to EPR 10)

Under the Water Environment (Water Framework Directive) Regulations (UK Parliament, 2017), we must exercise our functions to secure compliance with the Water Framework Directive (Directive 2000/60/EC), which seeks to protect ground and surface water on an integrated river basin basis, and the Environmental Quality Standards Directive (Directive 2008/105/EC). We have considered NNB GenCo (SZC)*'s* proposals in relation to the use of BAT to minimise discharges to the environment and the impact of these discharges on members of the public and the environment. As described earlier in section 4.7, we consider that NNB GenCo (SZC)'s proposals and the permit conditions represent the use of BAT to reduce the impact to as low as reasonably achievable. We are, therefore, satisfied that the conditions are sufficient in relation to these regulations, and that granting the permit with the conditions proposed will not cause the current status of the water body (that is, the coastal waters close to Sizewell C site) to deteriorate.

Schedule 22 of EPR 16 implements the Groundwater Directive (Directive 2006/118/EC) to require all necessary measures to be taken to prevent the input of any hazardous substances to groundwater, and to limit non-hazardous pollutants entering groundwater, so that they do not cause pollution. The permit does not allow any releases to groundwater from the combustion activities.

Human Rights Act 1998 (HRA 98)

We have considered potential interference with rights addressed by the European Convention on Human Rights in reaching our decision. We consider that our decision is compatible with our duties under the Human Rights Act 1998 (UK Parliament, 1998). In particular, we have considered the right to life (Article 2), the right to a fair trial (Article 6) (which here includes the right to a reasoned decision – as provided in this decision document), the right to respect for private and family life (Article 8) and the right to protection of property (Article 1, First Protocol).

Public participation and duty to involve

Regulation 60 of EPR16 requires us to prepare and publish a statement of our policies for complying with our public participation duties. We have published such a document, Environmental permits: when and how we consult (Environment Agency, 2019) and we consulted on this application in line with this document. This satisfies the requirements of the Public Participation Directive.

Section 23 of the Local Democracy, Economic Development and Construction Act 2009 (GB Parliament, 2009d) requires us, where we consider it appropriate, to take necessary steps to involve interested persons in exercising our functions by providing them with information, consulting them or involving them in any other way.

We have described in section 3.6 of this decision document our consultation in relation to this application. We have described the way in which we have taken account of representations we have received in Appendix 1.

Deregulation Act 2015 – Growth duty

We considered our duty to have regard to the desirability of promoting economic growth set out in section 108(1) of the Deregulation Act 2015 (UK Parliament, 2015) and the guidance issued under section 110 of that Act in deciding whether to grant this permit.

Paragraph 1.3 of the guidance says:

“The primary role of regulators, in delivering regulation, is to achieve the regulatory outcomes for which they are responsible. For a number of regulators, these regulatory outcomes include an explicit reference to development or growth. The growth duty establishes economic growth as a factor that all specified regulators should have regard to, alongside the delivery of the protections set out in the relevant legislation.”

We have addressed the legislative requirements and environmental standards to be met in chapter 4 of this decision document. Paragraph 1.5 of the guidance is clear that encouraging economic growth should not be pursued at the expense of protecting the environment.

We consider the requirements and standards we have set in the permit are reasonable and necessary to protect the environment and people. This also promotes growth among

legitimate applicants and operators, because the standards applied to the applicant are consistent across businesses in this sector and have been set to achieve the required legislative standards.

Equality Act 2010

We have had regard to the Public Sector Equality Duty and are satisfied that our decision and decision-making process are in accordance with the duty. We carried out an equality analysis to help inform our engagement activities relating to the Sizewell C project.

4.9 Matters which are outside the Environment Agency's permitting remit

Location of the installation

Decisions about land use are matters for the land-use planning system. The location of the facility is a relevant consideration for environmental permitting, but only with regard to its potential to have an adverse environmental impact on members of the public or sensitive environmental receptors. We have assessed the impact on members of the public and the environment as part of the determination process, it is reported in section 4.5 of this decision document, and is small and well within relevant limits and constraints.

Flood risk

We provide advice and guidance on flood risk in our consultation responses relating to the operator's application to the planning authority for a Development Control Order (DCO). Both the applicant and planning authority normally accept our advice on these matters. The Office for Nuclear Regulation (ONR) considers flood risk as part of the licensee's safety case under the nuclear site licence.

Some consultees have raised concerns about the effects of flooding on the safety of the site. We have passed these consultation responses to ONR.

5 Our decision

Our decision is that we should grant the application and issue a permit. A permit, containing our conditions is available on our online consultation hub.

5.1 Conditions of permit

The permit contains many conditions taken from our standard environmental permit template, including the relevant annexes. We developed these conditions in consultation with industry, having regard to the legal requirements of the Environmental Permitting Regulations and other relevant legislation. This document does not therefore include an

explanation for these standard conditions. Where they are included in the permit, we have considered the application and accepted the details are sufficient and satisfactory to make the standard condition appropriate. This document does, however, provide an explanation of our use of ‘tailor-made’ or installation-specific conditions, or where our permit template provides 2 or more options.

The standard permit template consists, principally, of:

- an introductory note (this is not part of the permit)
- a certificate page, granting the permit
- Parts 1 to 4, being standard conditions about management, operations, waste management and monitoring, and provision of information
- Schedule 1, defining the activities permitted
- Schedule 3, specifying routes for, monitoring and limits on emissions to air, water and land
- Schedule 4, specifying reporting requirements
- Schedule 5, notification form
- Schedule 6, interpretation
- Schedule 7, a site plan showing the geographical extent of the regulated facility

The conditions in Parts 1 to 4 of the permit have not been modified from the standard conditions of our template.

In Schedule 1, we have included:

- 4 improvement or information requirements
- 5 pre-operational measures

for the reasons explained in chapter 4 of this decision document.

Schedule 3 specifies the proposed point source releases and, as relevant, the proposed limits that apply to specific substances for each of the approved release points.

We are of the view that our decision and permit conditions are consistent with the relevant legislation, and that we have determined the application having regard to the statutory guidance concerning the regulation of discharges into the environment and relevant government policy.

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Glossary

Term	Meaning
Activity	A generic title for the practices or operations which require permitting (unless exempt from the need for a permit).
ALARP	As low as reasonably practicable.
AONB	Area of Outstanding Natural Beauty
AQS	Air quality standard.
BAT	Best available techniques – see below for full definition.
DCO	Development Consent Order.
EAL	Environmental assessment level.
EDF	Électricité de France.
EDG	Essential diesel generator.
EPR	European Pressurised Reactor.
EPR 16	Environmental Permitting (England and Wales) Regulations 2016.
EMS	Environmental management system.
EQ	Equipment qualification.
EQS	Environmental quality standard.
FSA	Food Standards Agency.
FWP	Forward work plan.
GDA	Generic design assessment.
LEP	Local enforcement position.

LOOP	Loss of off-site power.
HPA	Health Protection Agency (superseded by Public Health England).
HPC	Hinkley Point C.
HRA	Habitats Regulations assessment.
HSE	Health and Safety Executive.
IED	Industrial Emissions Directive.
IPC	Infrastructure Planning Commission.
IEEE	Institute of Electrical and Electronics Engineers.
iSODA	Interim statement of design acceptability.
NGO	Non-governmental organisation.
NID	National Infrastructure Directorate.
NO_x	Nitrogen oxides.
MWe	Megawatt electrical, a measure of electrical power.
MCR	Maximum combustion rate.
MCPD	Medium Combustion Plant Directive.
ONR	Office for Nuclear Regulation: a statutory public corporation, responsible for regulation of nuclear safety and security across the UK.
PM	Particulate matter.
PC	Process contribution.
PEC	Predicted environmental concentration.

PHE	Public Health England (which superseded the Health Protection Agency (HPA) in 2013) and which became part of the UK Health Security Agency (UKHSA) in 2021.
PWR	Pressurised Water Reactor.
RCC-E	Design and construction rules for electrical components of PWR nuclear islands.
Regulated facility (RF)	A collective term for the range of activities permitted under EPR.
SAC	Special Area of Conservation.
SCR	Selective catalytic reduction.
SEC	Specific energy consumption.
SODA	Statement of design acceptability.
SNCR	Selective non-catalytic reduction.
SPA	Special Protection Area.
SPZ	Source Protection Zone.
SSSI	Site of Special Scientific Interest.
Sustainable development	Development which meets the needs of the present without compromising the ability of future generations to meet their own needs. Specific to radioactive waste, the government's policy is to "ensure that radioactive waste is managed safely and that the present generation, which receives the benefit of nuclear power, meets its responsibilities to future generations."
SZC	Sizewell C.
TLAP	Total loss of AC power.
UDG	Ultimate diesel generator.
UKCP18	UK Climate Projections 2018.

UKHSA	UK Health Security Agency, previously Public Health England (PHE).
WDA	Water discharge activity.

The term ‘best available techniques’ (BAT) means the latest stage of development (state of the art) of processes, facilities or methods of operation, which indicates the practical suitability of a particular measure for limiting discharges, emissions and waste. In determining whether a set of processes, facilities and methods of operation constitute the best available techniques in general or individual cases, special consideration shall be given to:

a) comparable processes, facilities or methods of operation which have recently been successfully tried out
b) technological advances and changes in scientific knowledge and understanding
c) the economic feasibility of such techniques
d) time limits for installation in both new and existing plants
e) the nature and volume of the discharges and emissions concerned

It therefore follows that what is ‘best available techniques’ for a particular process will change with time in light of technological advances, economic and social factors, as well as changes in scientific knowledge and understanding.

If the reduction of discharges and emissions resulting from the use of best available techniques does not lead to environmentally acceptable results, additional measures have to be applied.

‘Techniques’ include both the technology used and the way in which the installation is designed, built, maintained, operated and dismantled.

Appendix 1 - Consultations

The application and our proposed decision were advertised and consulted on in accordance with our public participation statement and government consultation principles. The way in which these have been carried out and how we have carefully considered consultation responses in preparing our decision are summarised in this appendix and section 3.6 of this document. Copies of all consultation responses have been placed on our public register except where the person making the response asked us not to do so. Responses made using our e-consultation tool can also be accessed online via our consultation hub.

How we publicised the consultations on the application and our proposed decision

The consultation on the application was advertised by a notice on GOV.UK from 6 July to 2 October 2020 and by issuing a press release. The notice provided brief details of the application, told people where they could see a copy of the application, and how to make comments. Copies of the application were made available for public inspection using our e-consultation tool via our consultation hub.

We publicised the application consultation by issuing press releases, advertising in a local newspaper and writing directly to a number of organisations and individuals inviting them to participate. As the application was made at a time when the government had placed restrictions on the movements and activities of the public due to the Covid-19 pandemic, we were unable to hold a consultation drop-in session or place copies of the application in local libraries and institutions as we would usually. We held a public question and answer session by phone on 20 July 2020 and put in place processes to enable interested parties to respond to the consultation over the telephone. We asked NNB Gen Co (SZC) to make copies of the application available on USB sticks, which it did.

The consultation on our proposed decision was advertised by a notice on GOV.UK from 4 July to 25 September 2022 and by issuing a press release. The notice provided brief details of the consultation, told people where they could see a copy of the proposed decision and supporting documents, and how to make comments. We made copies of the proposed decision and related documents available for public inspection using our e-consultation tool via our consultation hub.

We took a similar approach to publicising the proposed decision consultation as with the application consultation (by issuing press releases, advertising in a local newspaper and writing directly to a number of organisations and individuals inviting them to participate). We also publicised and held consultation drop-in sessions in the Sizewell area in July 2022. These were held in Saxmundham, Aldeburgh and Leiston. We also held a virtual public drop-in session in September 2022, which was similarly advertised.

Who we consulted

We wrote to the following bodies informing them of the application and our subsequent proposed decision, directing them to copies of the application online and our proposed decision document:

- East Suffolk Council - Environmental protection/health, local planning authority
- Health and Safety Executive
- Food Standards Agency
- Director of Public Health
- Public Health England (now UK Health Security Agency (UKHSA))
- Clinical Commissioning Group
- Centre for Environment, Fisheries and Aquaculture Science (Cefas)
- Eastern Inshore Fisheries and Conservation Authority (IFCA)
- Anglian Water
- Historic England
- Marine Management Organisation
- National Park (The Broads)
- Natural England

We also emailed over 800 other interested groups, non-governmental organisations, councils, members of parliament, businesses and individuals, informing them of the consultations and inviting them to participate.

Responses to the consultation on the application

We received 24 responses from organisations and individuals for the application consultation. Where comments were raised, these are summarised here, together with our consideration of them.

Responses from organisations listed in the consultation section

Response received from Public Health England (now UK Health Security Agency (UKHSA))

Brief summary of issues raised

- Based on the information contained in the application, Public Health England (now UK Health Security Agency (UKHSA)) has no significant concerns regarding the risk to the health of the local population from the installation. Reducing public exposures to pollutants with no known threshold below air quality standards, such as

particulate matter and nitrogen dioxide, has potential public health benefits. Public Health England supports approaches which minimise or mitigate public exposure to air pollutants with no known thresholds and address inequalities (in exposure) and encourage their consideration during site design, operational management, and regulation. Public Health England's consultation response is based on the assumption that the permit holder shall take all appropriate measures to prevent or control pollution, in accordance with the relevant sector guidance and industry best practice.

Our consideration of the issues

We have audited NNB GenCo (SZC)'s air quality modelling assessment and agree with its conclusions that exceedances of the relevant air quality objectives and environmental assessment levels on human health are unlikely. We consider that NNB GenCo (SZC) is applying the best available techniques to prevent and minimise emissions to air as far as possible subject to nuclear safety requirements. NNB GenCo (SZC)'s air quality management plan has been incorporated into the permit in Table S1.2. This includes operational measures that NNB GenCo (SZC) will follow to ensure that the impact of emissions is minimised. Pre-operational condition PO4 of the permit requires the operator to review the measures proposed in the air quality management plan nearer to the commissioning of the installation to ensure that any additional measures are considered once the plant's commissioning and routine testing programmes have been finalised.

Response received from Historic England

Brief summary of issues raised

- Historic England informed us that it is a statutory consultee with regards to the ongoing Development Consent Order (DCO) application, and the situation in relation to the historic environment is currently under discussion.

Our consideration of the issues

No action required.

Response received from Marine Management Organisation

Brief summary of issues raised

- Marine Management Organisation informed us that any works within the marine area require a licence from the Marine Management Organisation. It is down to the applicant themselves to take the necessary steps to ascertain whether their works will fall below the mean high water springs mark.

Our consideration of the issues

No action required.

Response received from East Suffolk Council – Environmental health

Brief summary of issues raised

- East Suffolk Council informed us that it is a consultee to the ongoing Development Consent Order (DCO) process and the situation in terms of noise and amenity is currently under discussion and assessment in terms of the proposed activity prior to examination. Currently there are no noise or amenity issues, neither is there any ongoing enforcement as the facility is some way off being consented or built.

Our consideration of the issues

No action required.

Representations from community and other organisations

Response received from Suffolk Coastal Friends of the Earth

Brief summary of issues raised

- Suffolk Coastal Friends of the Earth points out that it is not at all certain that diesel generators will be available or legal when Sizewell C is planned to be on stream, (after 2035). Supposing that they are, there is very little to be found in EDF's DCO documents concerning combustion activities via diesel generators. It is a concern that those being used during operation would be positioned so close to the Minsmere-Walberswick SAC, SPA and Ramsar and Sizewell Marshes SSSI. There is considerable scientific evidence that where nitrogen dioxide is present plants produce defensive chemicals to protect themselves. Invertebrates feeding on these, such as the caterpillars of butterflies or moths, are harmed by these chemicals and grow poorly compared to those that are unaffected by diesel fumes. Any diesel generators should be positioned well away from designated sites and the present position is not appropriate due to the rarity of many of the plants and insects close by which would be affected by the fumes.
- A further concern relates to the mobile generators to be used in the construction of the plant.
- For these reasons, and given the rare assemblages of plants and invertebrates on the SSSI and featured in the citation, such generators should not be used due to the harm they would cause.

Our consideration of the issues

The diesel generators have been chosen based on the requirements to meet safety functional requirements, be safety qualified and meet relevant quality standards as part of nuclear safety. NNB GenCo (SZC) compared 3 options for the technology to supply an independent emergency electricity supply to Sizewell C power station:

- option 1 – diesel generators run on fuel oil
- option 2 – gas turbines run on fuel oil
- option 3 – gas turbines run on gas

Section 4.7.2 of this decision document explains the assessment in more detail. We agree with NNB GenCo (SZC)'s conclusions that option 1, is the best available technology and can be used to provide the emergency electricity supply to the essential systems for the Sizewell C power station.

We have considered the potential effects of discharges to air from the site on plant and animal life at the relevant designated 'European sites' (Special Protection Areas (SPAs) for birds, and Special Areas of Conservation (SACs) for other species, and for habitats) and SSSIs as detailed in section 4.5.4 of this decision document. We do not believe that, for any relevant European site, the operation of the Sizewell C combustion plant will affect their ecological structure, function and ecological processes across their whole area. We were able to reach this conclusion for the long-term emissions of NOx as the critical level will not be exceeded by the commissioning and operation of the installation. For the short-term emissions of NOx, nutrient enrichment and acidification, we were able to reach the conclusion due to the more realistic modelling results confirming that the effects assessed would be low impact, too small, and for the commissioning of the Sizewell C combustion plant, too short lived not to achieve the conservation objectives. The assessment for the SSSIs is consistent with the Habitats Regulations assessments. We have concluded that the proposal does not damage the special features of the SSSIs.

The construction generators are beyond the scope of this application. We have used best available information in our assessments. We will carry out further assessments out when the relevant applications are applied for.

Representations from individual members of the public

Brief summary of issues raised

Use of diesel generators

- For a power plant, which is not likely to be operational for some time, the use of diesel generators is ridiculous when the intention is to phase out, for example, diesel cars by 2030. This proposal is not likely to be the best available technique.

- This application relates to the use of diesel generators as backup. That does not appear to be future proofed given that it relates to using fossil fuels which are outdated, are polluting and contributing to a high carbon footprint.

- There should not be any acceptance of diesel generators. By the time SZC becomes operational, if indeed it ever does, it will be the mid-2030s, halfway to the UK reaching net zero. Why would anyone consider new diesel generators to be acceptable? They should be replaced by equipment powered by batteries or green hydrogen, not a fossil fuel.

- The UK government has pledged to bring forward a ban on new diesel car sales from 2040 to 2035 in acknowledgement of diesel emissions' significant contribution to global climate change and to the pollution of air, water, and soil, with consequent health impacts for humans and ecosystems. In light of this, it is unacceptable to give consent to diesel generation on this scale for a development that will not be operational until 2034 at the earliest and for which the main selling point is its purported low carbon credentials.

- There is not much to be said about this proposed permit application beyond pointing out the irony of using diesel backup in what is supposed to be a state-of-the-art nuclear plant, especially as diesel is being phased out as an environmentally harmful material.

- The intention is that diesel should be phased out, so what is the replacement backup moving forward?

- EDF does not clarify what alternatives to diesel generation have been considered and what the grounds were for their dismissal. We have seen with EDF's transport strategy for SZC construction a preference for cheap/quick options regardless of their impact on local people and ecosystems. This is totally unacceptable.

Our consideration of the issues

The diesel generators have been chosen based on the requirements to meet safety functional requirements, be safety qualified and meet relevant quality standards as part of nuclear safety. NNB GenCo (SZC) compared 3 options for the technology to supply an independent emergency electricity supply to Sizewell C power station:

- option 1 – diesel generators run on fuel oil
- option 2 – gas turbines run on fuel oil
- option 3 – gas turbines run on gas

Section 4.7.2 of this decision document explains the assessment in more detail. We agree with NNB GenCo (SZC)'s conclusions that option 1, is the best available technology and can be used to provide the emergency electricity supply to the essential systems for the Sizewell C power station.

As the operation of the plant is not planned until the mid-2030s, we have also included a pre-operational condition PO5 in the permit that requires the operator to review the availability of any suitable generators that achieve lower emissions than proposed in the application, including a review of the feasibility of fitting selective catalytic reduction to the generators, nearer to the commissioning. This will ensure that the best available generators will be installed, therefore ensuring that the emissions to air are minimised.

Brief summary of issues raised

Environmental impact

- Given the large number (12) of diesel generators across the 2 EPR units, and their significant size, there are a number of challenges to the environment, including noise and odour. Together with the addition of the 4 Sizewell B diesels, this will only add to the environmental challenge. As these diesel generators will need to be tested and their performance checked, there is a possibility of multiple diesel generators running at the same time. The diesel generators will be required to run continuously to prove their reliability, therefore there is an increase in the discharge of noxious fumes and noise. Has a study been carried out on the probability of such an occurrence and the effects felt by the closest neighbours Sizewell village?

Our consideration of the issues

NNB GenCo (SZC) provided us with details of the operating scenarios and confirmed that during the commissioning and routine testing, only one EDG or UDG is likely to be in operation at any one time. The diesel generators won't be run continuously. The operator has assessed the installation's potential emissions to air against the relevant air quality standards, and the potential impact on local conservation sites and human health. The operator has also assessed the installation's noise impact. NNB GenCo (SZC) provided us with modelled output showing the concentration of key pollutants at a number of specified locations within the surrounding area. We have reviewed the way in which the operator used the models, its selection of input data, use of background data and the assumptions it made to establish the robustness of the operator's air impact and noise assessments. For the commissioning and routine testing scenario emissions, NNB GenCo (SZC) has concluded that exceedances of the relevant air quality objectives and environmental assessment levels are unlikely. The LOOP scenario is highly unlikely and represents the operation of the generators in the event of total power failure and is designed to prevent radioactive releases. This will result in short-term emissions of NOx above the environment assessment level (EAL). As a result of our detailed audit of NNB GenCo (SZC)'s modelling assessment, we are able to agree with NNB GenCo (SZC)'s conclusions in this respect, taking modelling uncertainties into account and the fact that the emissions modelled represented worst-case scenarios both in hours of operation and meteorological conditions. We also agree with the operator's conclusion that adverse or significant adverse noise impacts are unlikely at nearby receptors.

We have considered the potential effects of discharges to air from the site on plant and animal life at the relevant designated 'European sites' (Special Protection Areas (SPAs) for birds, and Special Areas of Conservation (SACs) for other species, and for habitats) and SSSIs as detailed in section 4.5.4 of this decision document. We do not believe that, for any relevant European site, the operation of the Sizewell C combustion plant will affect their ecological structure, function and ecological processes across their whole area. We were able to reach this conclusion for the long-term emissions of NOx as the critical level will not be exceeded by the commissioning and operation of the installation. For the short-

term emissions of NOx, nutrient enrichment and acidification, we were able to reach the conclusion due to the more realistic modelling results confirming that the effects assessed would be low impact, too small and, for the commissioning of the Sizewell C combustion plant, too short lived not to achieve the conservation objectives. The assessment for the SSSIs is consistent with the Habitats Regulations assessments. We have concluded that the proposal does not damage the special features of the SSSIs.

Brief summary of issues raised

Abatement of emissions

- In the HPC EDF technical information (assuming the same for SZC) it is stated that "The infrequent use of the plant (less than 1% of the year) means that the abatement equipment is not considered BAT." Given the high number of large diesel generators on both Sizewell B and C, this approach does not appear to be consistent with best available techniques (BAT) and conservative decision-making, taking into account reducing environmental impact. Based on the above, it would appear that NOx storage-reduction catalysts should at least be reviewed and considered. Has the Environment Agency considered the impact given the number and size of these diesel generators across the 2 Sizewell sites?

Our consideration of the issues

NNB GenCo (SZC) assessed the use of end-of-pipe flue gas technologies such as selective catalytic reduction (SCR) and selective non-catalytic reduction (SNCR) to reduce NOx emissions. The conclusion was that as these technologies require steady operating conditions to function effectively, they are not a practical cost-effective consideration for applications of this type, where the plant is only operated infrequently. In addition, it is not possible to seismically qualify the abatement plant. During a seismic event, the plant would likely be inoperable and, if physically damaged, could present a risk of damage to the diesel generators, if for example, the abatement plant collapsed. We agree with NNB GenCo (SZC)'s assessment of secondary abatement measures for the diesel generators.

The impact from the other sites has been considered in the local background data that has been used in the air quality assessment.

Brief summary of issues raised

Ozone pollution

- Diesel combustion would fuel regional tropospheric ozone pollution levels, already exacerbated by SZC construction. Ozone pollution already consistently exceeds government objectives locally, with this region often being the worst in the UK. To propose to emit more ozone precursor pollutants without evaluating their impact is totally unacceptable. Despite this, EDF inexplicably and negligently makes no acknowledgment of diesel's role in generating ozone pollution or, indeed, mentions ozone pollution at all.

- The impact of emissions on air pollution of all types (nitrous oxides and particulates in particular) and, specifically, of ozone precursors must be evaluated, taking into account seasonal, meteorological and climate change factors and their cumulative impact in conjunction with all other emissions generated by SZC, as well as those of other major infrastructure projects in the region, over the period of construction, operation and decommissioning.

Our consideration of the issues

Ozone is produced by the action of sunlight on oxides of nitrogen (NO_x). The potential of substances such as NO_x to form ozone when reacting with sunlight is a factor considered when setting ambient air quality standards. While the process contribution for short-term NO_2 has not been screened out as insignificant, it is concluded that exceedances of the relevant air quality objectives for human health are not likely. This has been considered in section 4.5.1 of this decision document. Therefore, it is not considered that any additional controls or conditions are required, beyond those already proposed to minimise emissions.

NNB GenCo (SZC) has assessed the impact of all relevant air pollutants, including NOx and particulates to support the application. The air quality modelling assessment takes into account the local background concentrations and emissions during all 3 operational scenarios (commissioning, routine testing and LOOP event). The commissioning and operation of the diesel generators are set in the context of a wider project, including operational radioactive substances activity and water discharge activity permits and will be subject to construction permits. An in-combination assessment has been carried out where the PEC is predicted to be <70% critical level or load, to ensure that this threshold will not be exceeded when considering other competent authority plans, permissions and projects (PPP) that will take place prior to the operation of SZC combustion activity and where there is enough information available to inform an assessment. The construction generators are beyond the scope of this application. We have used best available information on our assessments. Further assessments will be carried out when the relevant applications are applied for. Decommissioning will form a part of NNB GenCo (SZC)’s environmental management system (EMS).

Brief summary of issues raised

Impact on habitats

- Diesel emissions do not just affect human health, but could also be very damaging to the sensitive ecosystems, which surround the SZC site. The cumulative effect of all the adverse impacts of SZC construction and operation must be taken into account in reviewing this one element. While individually, the impacts may appear relatively small, looked at holistically (habitat destruction and dislocation, hydrology disruption, noise, light and air pollution, to name just a few), the cumulative effects are likely to be catastrophic.

- EDF acknowledges significant impacts on habitats in the vicinity in respect of nitrogen and acid deposition, but considers it insignificant because of 'the background rates of high chronic deposition' (Non-technical summary, p4). This neat piece of Catch-22 logic is totally unacceptable (and could - wrongly and absurdly – be used to justify an escalation of pollution and harm in any context), especially as the background deposition rates are undoubtedly impacted adversely by EDF's own activities.

- Given the sensitivity of the surrounding location and its numerous protected designations, there can be no scientific (or legal) basis for increasing the consented limits for emissions that were agreed when permissions were granted for Sizewell B. Without this scientific basis, any increase in consented levels, beyond those agreed by the Secretary of State for Sizewell B, might be regarded as a spurious calculation proportionate to the degree of industrial activity proposed rather than based on the science of what is necessary to protect the surrounding environment. As such, it may be open to legal challenge and potential judicial review.

- The UK is facing a biodiversity crisis, being one of the most wildlife depleted countries in the world. It also needs to reduce dependency on fossil fuels to meet the targets of the Paris Agreement. The discharges anticipated from SZC will make our biodiversity crisis worse and hinder meeting our carbon targets.

Our consideration of the issues

We have considered the potential effects of discharges to air from the site on plant and animal life at the relevant designated 'European sites' (Special Protection Areas (SPAs) for birds, and Special Areas of Conservation (SACs) for other species, and for habitats) and SSSIs as detailed in section 4.5.4 of this decision document. We do not believe that, for any relevant European site, the operation of the Sizewell C combustion plant will affect their ecological structure, function and ecological processes across their whole area. We were able to reach this conclusion for the long-term emissions of NOx as the critical level will not be exceeded by the commissioning and operation of the installation. For the short-term emissions of NOx, nutrient enrichment and acidification, we were able to reach the conclusion due to the more realistic modelling results confirming that the effects assessed would be low impact, too small and for the commissioning of the Sizewell C combustion plant, too short lived, to prevent achieving the conservation objectives. The assessment for the SSSIs is consistent with the Habitats Regulations assessments. We have concluded that the proposal does not damage the special features of the SSSIs.

The construction generators are beyond the scope of this application. We have used best available information in our assessments. We will carry out further assessments when the relevant applications are applied for.

Brief summary of issues raised

Particulates

- As the diesel generators have to be regularly tested, the public should be made aware of the level of particulate contamination.
- It would be useful if the Environment Agency made public the level of particulate contamination from the diesel generators and the public health threat they pose.

Our consideration of the issues

NNB GenCo (SZC)'s air quality assessment considered the impact of particulates (PM_{10} and $PM_{2.5}$) for all operational scenarios. The particulate emissions can be screened out as insignificant in that the PC is <1% of the long-term EQS/EAL and <10% of the short-term EQS/EAL for all scenarios. Therefore, we consider NNB GenCo (SZC)'s proposals for preventing and minimising the emissions of particulates to be BAT for the installation.

Responses to the consultation on the proposed decision

We received 33 responses from organisations and individuals for the proposed decision consultation. Where comments were raised these are summarised here, together with our consideration of them.

Responses from organisations listed in the consultation section

Response received from UK Health Security Agency (UKHSA))

Brief summary of issues raised

- UKHSA has no significant concerns regarding the risk to the health of the local population from the installation. This consultation response is based on the assumption that the permit holder shall take all appropriate measures to prevent or control pollution, in accordance with the relevant sector guidance and industry best practice.

Our consideration of the issues

No action required.

Response received from Historic England

Brief summary of issues raised

- A specialist member of staff has considered the documents provided and has concluded that there will be no further specific impacts of the activities on the historic environment that aren't already associated with the development itself, and therefore that it is outside of our remit to comment. Historic England therefore does not have any specific comment and is content for the examining authority to determine the application within its regulatory framework.

Our consideration of the issues

No action required.

Representations from individual members of the public

Brief summary of issues raised

Use of auxiliary combustion plant

- The new nuclear plant proposed at Sizewell will be unable to operate without an auxiliary combustion plant to maintain operations. Experience with most nuclear plants is that over their entire operating period from construction, through the operating phase, and into the several centuries of decommissioning, they will use more imported electrical power than they will actually generate from nuclear power.

Our consideration of the issues

12 diesel generators that relate to this application are safety classified standby equipment and only operated in the event of a power failure and during periodic testing. Energy use during construction, operation and decommissioning of the nuclear plant is beyond the scope of this application.

Brief summary of issues raised

Concept of using diesel generators

- The operation of standby power supply systems using diesel generators is unsustainable and a ridiculous concept. To burn more fossil fuels to maintain the production of power by the nuclear power plant if the need should arise is a waste of time and energy, increasing pollution levels and adding to the effects of climate change. It is hoped that the maximum of 500 hours allowed 'run time' per annum will not be exceeded, but this could happen if a significant event occurs.

- The running of a diesel generator for standby power seems acceptable if not particularly green.

Our consideration of the issues

The diesel generators have been chosen based on the requirements to meet safety functional requirements, be safety qualified and meet relevant quality standards as part of nuclear safety. NNB GenCo (SZC) compared 3 options for the technology to supply an independent emergency electricity supply to Sizewell C power station:

- option 1 – diesel generators run on fuel oil
- option 2 – gas turbines run on fuel oil

- option 3 – gas turbines run on gas

Section 4.7.2 of this decision document explains the assessment in more detail. We agree with NNB GenCo (SZC)'s conclusions that option 1, diesel generators run on fuel oil, is the best available technology and can be used to provide the emergency electricity supply to the essential systems for the Sizewell C power station.

As the operation of the plant is not planned until the mid-2030s, we have also included a pre-operational condition PO5 in the permit that requires the operator to review the availability of any suitable generators that achieve lower emissions than proposed in the application, including a review of the feasibility of fitting selective catalytic reduction to the generators, nearer to the commissioning. This will ensure that the best available generators will be installed, therefore ensuring that the emissions to air are minimised.

We have included condition 2.3.5 in the permit, which states 'The activities shall not operate for more than 500 hours per annum'. We acknowledge that the safe commissioning and operation of the emergency standby generators may require over 500 hours of annual operation. However, as has been demonstrated in the application, exceedances of the relevant air quality objectives and environmental assessment levels are unlikely in all operational scenarios. Furthermore, we have reached the conclusion that the operation of the installation will have no adverse effect on the integrity of relevant European sites, and will not damage the special features of relevant SSSIs.

Brief summary of issues raised

Emission standards

- In terms of the requirements for new standby plants, the Environment Agency is proposing a 'compromise too far' and where, were it to stand, the reputation of the Environment Agency would be irrevocably damaged. The assertion by NNB GenCo (SZC) that the same generators also must meet stringent nuclear safety requirements cannot be justification for excepting them from Environment Agency's national policy. To do so, would compromise the independence of the Environment Agency and potentially open the floodgates for many and varied forms of 'exceptionalism'.

- Capitulation by the Environment Agency on such a fundamental issue as emission standards (and particularly NOx) would be damaging on 5 fronts:

1. Were NNB GenCo (SZC) to prevail, it would be seen as an opportunity for other significant standby plant users to bring forward 'compelling economic cases' why the NOx benefit was just 'not worth the expense'.

2. Coastal East Suffolk would be left with a potential 60 year+ legacy of avoidable and unnecessary NOx emissions.

3. Should the UK government continue to pursue a policy of ‘new nuclear’, it would be likely that emerging operators would seek equal treatment by the Environment Agency.

4. The Environment Agency’s principle of BAT would effectively be compromised, possibly forever.

5. NNB GenCo (SZC) may seek the same exemption for other standby plant (such as desalination, concrete manufacture).

- As for NNB GenCo (SZC)’s assertion that “the cost to classify an alternative diesel generator with reduced NOx emissions would be grossly disproportionate to the benefit in NNB GenCo (SZC)’s view”, it is a ‘small world’ view based on vested interest, rather than ‘the big picture’ interpretation of worldwide threats that can be significantly reduced with relatively small adaptions.

- As a consequence, appeals to the Environment Agency to continue its endeavours and redouble their efforts to reduce avoidable, unnecessary pollution.

Our consideration of the issues

Section 4.7.4 of this decision document considers the diesel generator specification, associated emissions and whether these can be considered BAT. The proposed generators do not meet the latest emissions standards for standby plant. However, having assessed all the information provided to us, and particularly considered the fact that the diesel generators have a defined critical safety role in the safe shutdown of a nuclear power station in the event of an emergency situation, we have decided that the proposed generators are best overall and currently represent BAT for the installation. We have taken this decision on the basis that the generic design assessment (GDA) and complex safety qualification process constrain the technological options that can be considered technically available at present, and therefore what can be considered BAT for this installation.

BAT is always a site-specific consideration, which means that our consideration at this installation reinforces its principle, not compromises it, contrary to the assertion at point 4 above. Also, BAT is by no means static for nuclear standby plants and improvements in emissions performance are expected. We have included pre-operational condition PO5 in the permit that requires the operator to review the availability of any suitable generators that achieve lower emissions than the generators proposed in the application, and meet the nuclear safety standards, nearer the time of commissioning. We have expanded this condition to include an assessment of the feasibility of fitting selective catalytic reduction (SCR) to the generators to clarify our expectation under this condition. Furthermore, in the future, the expectation is that nuclear power plant standby safety generators will be able to comply with stricter emission standards as they become available for new nuclear plants. We may also expect abatement such as SCR to be retrofitted to standby combustion plant if this is determined to be BAT, as part of future permit reviews for the sector.

Brief summary of issues raised

Choice of technology – BAT

- There are omissions from the review of BAT as battery storage has not been considered in addition to diesel generators or gas turbines. Rechargeable battery storage would reduce diesel/gas turbine operating time and save significant emissions.

Our consideration of the issues

To address this issue, we asked NNB GenCo (SZC) to provide us with further information on why they had omitted the battery storage from the technology selection. It responded explaining that the initial reason that batteries were not considered within the BAT assessment is that the intent for SZC is to directly replicate Hinkley Point C (HPC). In the case of a loss of offsite power (LOOP) event and a full station blackout (SBO), all emergency and backup power is provided by independent diesel generation. This system design configuration is carried over from HPC to SZC. With the change of supplier for the ultimate diesel generators (UDGs), the system configuration and nuclear safety case remain based on diesel generation. As both the strategy and the detailed system specifications for on-site power production and management are based on this technological approach, any deviation has far-reaching consequences for station design/construction/commissioning, regulatory review and approvals, and all inherent aspects of established qualification and operation protocols.

Notwithstanding the above, batteries were not considered, as the space requirements to provide the full 360 hours of reliable electrical power in the case of LOOP or SBO was considered unrealistic for the SZC site. The electrical capacity requirement for the full station would be 32,400MWhs, which could be delivered by 10,800 Tesla Megapacks. The absolute minimum space required for this many Megapacks is significant, approximately 125,000m², which roughly equates to 12 football pitches. This figure doesn't account for any access or other supporting equipment required by the battery system.

In addition to the issues with footprint requirement, there are through life implications with using such batteries. The manufacturer guarantees the batteries for only 15 years. There is a possibility to obtain a 20-year warranty, however, as the battery bank would be providing an essential nuclear safety function, there would be a requirement to replace the cells at the latest after 15 years (which represents 4 full sets to cover the station life).

Furthermore, there is no evidence that such battery systems are yet qualified to nuclear standards for the full range of hazards and environmental conditions for which diesel generators are qualified. Therefore, in the above example, some additional redundancy is expected to account for non-availability (due to accident, reliability) or performance deterioration (extreme temperatures).

The final consideration to be made is with regards to natural hazards, external man-made hazards and security factors, which would likely necessitate enclosing the emergency systems in a protective environment in the same way as the EDGs and UDGs are protected within a highly engineered building. Creating a robust battery storage building of

this magnitude would present significant challenges and would come with many technical and environmental impacts in addition to programme delivery impacts.

Brief summary of issues raised

Management system – maintenance plans

- Section 4.4.4 of the decision documents states “We are not aware of any reason to consider that NNB GenCo (SZC) will not have the management system to enable it to comply with the permit conditions.” Many diesel generators and associated valves and controls do not work when required due to intermittent operations. As with section 4.4.7 of the decision document, there is nothing about the facilities management testing and maintenance, repair, replacement and enhancement plans. This is often the case where the data is taken as sufficient when new, but the deterioration of injectors and lack of use lead to departures. Much of the current nuclear fleet depends on sealing pipes and vessels with bentonite patches.
- Also, some generators will not auto-start in hot weather as happened in summer 2022. It is suggested that the working plans for repair, replacement and change out are obtained and added with dates relative to installation and operations. Again, the gaps in extended time between installation and late operations can be significant and corrosion and other changes may have occurred.

Our consideration of the issues

Pre-operational condition PO1 has been included in the permit. This requires NNB GenCo (SZC) to send a summary of the site environment management system (EMS) to the Environment Agency and make all documents and procedures which form part of the EMS available for inspection. The EMS shall be developed in line with the requirements set out in our web guide ‘Develop a management system: environmental permits’ (Environment Agency, 2016a). This shall include a site and equipment maintenance plan. The documents and procedures set out in the EMS shall form the written management system referenced in condition 1.1.1 (a) of the permit.

Also, both the EDGs and UDGs will undergo test runs to demonstrate reliability. If for any reason a diesel generator fails to start during a test run, a further test run would be required. The detailed test programme will depend on the station safety specification and manufacturer’s recommendations.

Brief summary of issues raised

Particulate filters

- It is suggested that the diesel or gas turbine burner stacks/exhausts are fitted with electrostatic or similar particular filters.

Our consideration of the issues

NNB GenCo (SZC)'s air quality assessment considered the impact of particulates (PM_{10} and $PM_{2.5}$) for all operational scenarios. The particulate emissions can be screened out as insignificant in that the PC is <1% of the long-term EQS/EAL and <10% of the short-term EQS/EAL for all scenarios as detailed in section 4.5.1 of this decision document. On this basis, we consider NNB GenCo (SZC)'s proposals for preventing and minimising the emissions of particulates BAT for the installation, and no further action is required.

Brief summary of issues raised

Pre-operational conditions

- The Environment Agency commented on a lack of certain baseline information and required NNB GenCo (SZC) to supply further reports under conditions PO2 and PO3. Will the Environment Agency be checking the accuracy of these reports or just relying on the company to get it right? The Environment Agency does not say.

- We welcome PO5 to ensure that if new technology results in lower emissions in the future, then these generators should be used rather than those currently in use.

Our consideration of the issues

We will carry out a full review of the reports submitted to us under the pre-operational requirements. Pre-operational conditions clearly state that the operator shall submit a written report to the Environment Agency for approval.

Brief summary of issues raised

Impact on invertebrates

- Has the assessment has been carried out on airborne impacts on invertebrates, a special interest feature of the adjacent Sizewell Marshes SSSI?

- There is a considerable body of research that points to diesel fumes affecting plants in such a way that they produce defensive chemicals. In turn, these have an impact on caterpillars that feed on these plants to the point that they will not thrive. This results, in particular, in an impact on survival rates of butterflies and moths.

- It is important to know what the impacts on invertebrates are likely to be from the combined effects of all emissions from diesel generators used at the SZC site.

Our consideration of the issues

The diesel generators are housed in enclosed buildings and emissions discharged through 27.2m stacks. This helps dispersion of emissions and reduces pollutant concentrations on nearby habitats. We have carried out an assessment of potential impacts on the habitat supporting the species, although we are unable to assess direct effects of aerial emissions

on individual invertebrate or other mobile species. This is because the Air Pollution Information System (APIS) provides information on potential impacts of air pollutants on species based on considering impacts on the habitat supporting the species. There are currently no comparable habitats with established critical loads available to assess the impacts of the deposition of nutrients on the invertebrate assemblage of Sizewell Marshes SSSI. Nor is there a comparable acidity class on which to assess acid deposition effects on the supporting habitat of the assemblage.

An assessment was made for the rich fen and rush pasture habitats within the SSSI. We were able to conclude that there would be no damage to these habitats from the diesel generators during the commissioning and operation of SZC. Natural England concurred with our conclusions.

We will assess the combined effects of all emissions from diesel generators used at the SZC site when the relevant applications are applied for.

Brief summary of issues raised

Detailed site drainage plan not available

- Can the Environment Agency confirm whether or not it is normal for a nuclear power station operator to be unable to provide "a detailed site drainage plan and the design details of the containment infrastructure at the time of the determination of the application?"

- Can the Environment Agency unequivocally confirm that proceeding with the 'permitting process' without the aforesaid information carries no additional risk or costs?

- It is noted that the Environment Agency contends that despite the foregoing information deficiencies the decision was nevertheless "…taken in accordance with our guidance on site condition reports and baseline reporting under the Industrial Emissions Directive."

Our consideration of the issues

NNB GenCo (SZC) has applied for operational environmental permits many years ahead of planned operations beginning. It is expected that any combustion activities would not take place at Sizewell C (SZC) before the mid-2030s. Therefore, we recognise that the detailed arrangements for some operations and compliance are not yet fully developed. We also accept that further site investigations can only be carried out when the layout is finalised and during excavations completed during the construction phase and closer to the start of the operations. On this basis, we do consider it normal and acceptable that a detailed site drainage plan and design details of containment infrastructure are not available at the time of the determination of the application. This does not carry an additional risk as NNB GenCo (SZC) is not able to commence the operation before the relevant information has been submitted to us under the pre-operational condition PO3 and we have approved the submission in writing. NNB GenCo (SZC) will be charged for

the time we spend assessing the information under our times and materials charging as detailed in our web guidance 'Environmental permits: when and how you are charged' (Environment Agency, 2022).

Submissions under pre-operational conditions PO2 and PO3 will ensure that requirements on site condition reports and baseline reporting under the Industrial Emissions Directive are met.

Brief summary of issues raised

Vague information about pollution control measures

- The Environment Agency notes "The proposed features of the installation for the prevention of pollution to ground and groundwater are detailed here." However, at the very next paragraph in respect to bulk fuel storage and secondary containment, it continues "The detailed design of the fuel storage facilities is not yet known. However, NNB GenCo (SZC) confirms that all tanks will be located in buildings." It continues, "The pollution prevention measures for fuels and oils stored and handled at the installation will comply with or exceed the relevant standards applicable at the time of construction." A statement that says little, as it does not even go to the trouble of saying that 'prior to any construction activity being undertaken, all standards will be met or exceeded, and will comply with changes made throughout the construction period'…however long that may be! Most notable though and among things that should reassure the public you can find; "Tanks comply with BS 5410…are of sufficient strength and structural integrity so that they are unlikely to leak during normal operations, are positioned on appropriately designed and constructed supports, and if possible, have a design life of 20 years."

- A little further on we are expected to be comforted to read "An automatic overfill prevention device will be fitted if the tank and vent pipe cannot be seen from where the filling operation is controlled" when surely the easiest and most simply understood commitment would be that "Automatic overfill devices will be fitted to all tanks and vent pipes." Subsequent paragraphs continue in the same vague way, employing ambiguity in places and omitting definitive statements as if deliberately. Whilst the Environment Agency is the author, one can only assume that NNB GenCo (SZC) is the source of much of the inexactitude.

- NNB GenCo (SZC) continues to be consistent in operating the same level of obfuscation, evasion and vagueness; experienced during pre-application consultations, in PR material and throughout the DCO examination.

- Despite the foregoing, it is slightly more reassuring that the Environment Agency expresses the view that "We are satisfied that the above measures and implementation of the operational phase of the site condition report will result in there being no significant risk of pollution to the land or groundwater beneath the site from the operational activities at the installation." However, it still begs the

question as to whether the Environment Agency is totally confident that the current lack of detail in respect to design and planning can really augur well for delivery, and merit the requisite permits?

Our consideration of the issues

NNB GenCo (SZC) has applied for operational environmental permits many years ahead of planned operations beginning. It is expected that any combustion activities would not take place at Sizewell C (SZC) before the mid-2030s. Therefore, we recognise that the detailed arrangements for some operations and compliance are not yet fully developed. We also accept that further site investigations can only be carried out when the layout is finalised and during excavations completed during the construction phase and closer to the start of the operations. NNB GenCo (SZC) has confirmed that pollution prevention measures for fuels and oils stored and handled at the installation will comply with or exceed the relevant standards applicable at the time of construction. Current best practice for above ground oil storage in bulk tanks is in accordance with our web guide 'Oil storage regulations for businesses' (Environment Agency, 2015). We are satisfied that this confirmation shows commitment. In addition, the permit includes pre-operational condition PO3 that requires NNB GenCo (SZC) to submit specific design details of the containment infrastructure for our approval prior to commencing the operations.

Brief summary of issues raised

Energy efficiency

- It seems ironic that NNB GenCo (SZC) and the Environment Agency can so easily dismiss (or tacitly agree) energy consumption as "of limited importance for standby plant." Qualifying with "This is because efficiency is a secondary measure to reliability/availability, and under normal operations, plant will only be operated for maintenance purposes and during periodic testing."

- Perhaps, the Environment Agency will reflect on the current 'cost of living crisis' and review whether NNB GenCo (SZC) and the Environment Agency should look again at opportunities to 'role model' behaviours and leverage energy efficiencies from within?

Our consideration of the issues

We have not dismissed the energy consumption as of limited importance for standby plant, but acknowledge that nuclear safety is paramount. Condition 1.2 Energy efficiency requires NNB GenCo (SZC) to take measures to ensure that energy is used efficiently in the activities, and review and record at least every 4 years whether there are suitable opportunities to improve the energy efficiency of the activities.

Brief summary of issues raised

Efficient use of raw materials

- Discussions at both the pre-application consultations, the Planning Inspectorate examination and subsequent meetings between NNB GenCo (SZC) and local councils have highlighted the parlous state of the East of England's available potable water supply. This was subsequently confirmed by Northumbrian Water when searching for an achievable resolution to NNB GenCo (SZC)'s demand for millions of litres per day, both during construction and throughout operation and decommissioning.

- It is unclear whether a viable resolution has yet been found, agreed and validated with all the necessary authorities. Consequently, the Environment Agency's assertion that "Having considered the information submitted in the application, we are satisfied that the appropriate measures will be in place to ensure the efficient use of raw materials and water" rings alarm bells and suggests that the Environment Agency has been found 'asleep on watch'!

Our consideration of the issues

Our assessment about the efficient use of raw materials and water considers solely this permit application (combustion plant), not raw materials or water usage within the wider development.

Brief summary of issues raised

Climate change adaptation

- It is noted that the Environment Agency's position in respect to NNB GenCo (SZC)'s climate change adaptation risk assessment is summarised as "satisfactory". It is also noted that the risk assessment identified the combustion plant as likely to be at risk from the impacts of climate change, particularly the impact of increased temperatures on the plant's ventilation system. NNB GenCo (SZC)'s response appears to be that "additional cooling systems and building insulation will be considered at the design stage of the plant which will mitigate the risk."

- Moreover, the assessment also noted increased risk for the overloading of "surface water drainage systems" arising from increased rainfall and rainfall intensity ("through flash flooding and prolonged rainfall"). NNB GenCo (SZC)'s response appears to be acceptance of the additional risk and a proposal to "…increase the site's surface water falls and surface water storage capacity."

- Even more concerning is confirmation (based on the risk assessment) that "the most significant risk is posed by increasing sea levels. The site is located within an area at risk of flooding (Flood risk 3) because of rivers or seas without defences", with the Environment Agency adding, whilst "…the site will be protected against flooding from the sea by its elevation. This may not ensure a dry site under all

conditions…" Importantly, it is noted the Environment Agency has notified those agencies with direct responsibility for considering this vital facet of the station's approval.

- Additionally, the Environment Agency has also taken the step of including "condition 1.5.1 in the permit requiring the operator to review and update its climate change risk assessment over the life of the permit."

- One can only hope that those agencies recognise this critical issue and act speedily and effectively to get suitable remedies from NNB GenCo (SZC).

Our consideration of the issues

Some of the issues raised on this topic are general comments rather than issues that require action. In terms of flood risk, we provided advice and guidance on flood risk in our consultation response relating to NNB GenCo (SZC)'s application to the planning inspectorate for a Development Consent Order. Our advice on these matters is normally accepted by both the applicant and the planning authority. The Office for Nuclear Regulation considers flood risk as part of its regulation of nuclear licensed sites, which includes the storage of radioactive wastes. Flood risk and other external hazards is to be addressed as part of the safety case for the site developed by NNB GenCo (SZC). NNB GenCo (SZC) has applied to ONR for a nuclear site licence.

Brief summary of issues raised

Choice of fuel and emission control

- The Environment Agency asserts "As part of the development process, NNB GenCo (SZC) has considered suitable fuels for the provision of emergency power." As a result, NNB GenCo (SZC) has found diesel to be its fuel of choice, because as a long-chain hydrocarbon it has:
  - greater energy to volume, therefore lower storage volume required
  - a lower evaporation rate, meaning fewer fugitive losses from storage

- In respect to emissions, in large combustion plant "the techniques for controlling releases of NOx, carbon monoxide and particulates (particulate matter (PM)) are based on burner design, the method of atomisation and the control of primary, secondary and tertiary air. A control loop system is required to govern the air and fuel supply and is significant in air pollution control. NOx control will also be addressed via a maintenance programme to ensure diesel generator performance is optimised.

- NNB GenCo (SZC) has effectively ruled out "selective catalytic reduction (SCR) and selective noncatalytic reduction (SNCR) to further reduce NOx emissions." Its conclusion was that "as these technologies require steady operating conditions to function effectively, they are not a practical, cost-effective consideration for applications where the plant is only operated on an infrequent basis."

- In respect to sulphur emissions to air from fuel, NNB GenCo (SZC) emphasises the "EDGs will use low sulphur oils (below 0.1% w/w sulphur)…[precluding] the need for any form of flue gas desulphurisation (FGD)." As stated, the maximum sulphur content of fuel oil and therefore emissions of sulphur dioxide are controlled by the SCOLF Regulations and no monitoring or ELVs are proposed for this pollutant. It continues "For safety reasons, there should be different sources of fuel supply. This will not have any effect on the sulphur content of the diesel fuel used, as all suppliers will be required to provide low sulphur diesel to minimise SO_2 emissions."

- The Environment Agency advises that NNB GenCo (SZC) has carried out a load test at HPC EDGs using ultra-low sulphur gas oil (below 0.001% w/w sulphur) successfully, but further testing is required before the operator can confirm that both EDGs and UDGs can be run on ultra-low sulphur gas oil. The Environment Agency has set a pre-operational condition PO4 in the permit that requires NNB GenCo (SZC) to review and update its air quality management plan, including possibly using ultra-low sulphur gas oil before the commissioning of the plant.

- Given the proximity to protected sites, it would seem sensible for the Environment Agency to determine that NNB GenCo (SZC) use ultra-low sulphur fuels throughout its supply chain and its operational sites (including the standby power combustion capabilities).

- The Environment Agency has reviewed NNB GenCo (SZC)'s choice of technology and has agreed in principle that the proposed equipment represents BAT for the installation. However, the Environment Agency also advises that NNB GenCo (SZC) was required to carry out a further BAT assessment of chosen diesel generators because the proposed generators do not meet the latest emissions standards for standby plant.

Our consideration of the issues

Issues raised on this topic are general comments rather than issues that require further action. Suggestions to use ultra-low sulphur fuels throughout the supply chain are beyond the scope of this permit application.

Brief summary of issues raised

Combination effects

- Main concern is that the backup generators appear to be considered in isolation. With the later introduction of a desalination plant, which would require diesel generators, a full assessment of combined effects should be considered. Also, concern that further diesel generators may have to be used during construction. At Hinkley Point C, new generators have been introduced which were not originally planned for.
- Concern about permanent desalination station and construction permits and request assurances from the Environment Agency that, should additional combustion activities become a feature of the plant, applications would be required, and a public consultation held.

- Requesting the Environment Agency to advise whether the exhaust stacks for other combustion plants would be required to be of a similar design as standby generator design (27.2m).
- Requesting the Environment Agency to advise, should the generators for desalination plant be a requirement, what would be the proposed basis of the long, medium and short-term impacts and any arrangements for routine testing and LOOP assessments.
- Requesting the Environment Agency to advise, should additional combustion activities become a feature of the proposed station, what basis it will adopt to assess the revised total impacts of SZC combustion activity and monitor the combined impacts of SZB, SZC and any residual decommissioning combustion activity at SZA. Has the Environment Agency made an assessment of the likely upper limit of additions 'the site' could reasonably expect to accommodate?
- The diesel-powered desalination units will be vastly more damaging to the local environment than those used for standby generators. Therefore, the Environment Agency would be wrong not to cross relate both of these diesel powered solutions when considering granting a permit.
- How can the impacts of diesel backup be agreed if permanent desalinisation is going to happen at Sizewell C, and this has yet to be incorporated into these calculations?

Our consideration of the issues

The construction and desalination generators are beyond the scope of this application. We have used best available information in our assessments. We will carry out further assessments including any in-combination assessments when the relevant applications are applied for. Variation application is required for any changes to this permit. Any other proposals that fall under The Environmental Permitting (England and Wales) Regulations 2016 (EPR 2016) (UK Parliament, 2016) require a permit application to be submitted to us. Applications will be consulted in accordance with our public participation statement and government consultation principles.

Brief summary of issues raised

Legal operator status

- Concern about whether NNB GenCo (SZC) and NNB GenCo (HPC) can be considered 'sister companies' given their structure as something akin to Special Purpose Vehicles, wherein it is broadly agreed it is only the investors who share the bulk of the risk and returns. Would now like to test the assuredness of the Environment Agency in its avowal that NNB GenCo (SZC) can indeed be "the person who will have control over the operation of the facility if the proposed permit is granted." Until there is absolute (and proven) clarity on the legal status and structures of NNB GenCo (SZC), the rights of investors or various 'shareholders' and the accountabilities within and without a Regulated Asset Base (RAB) funding, who actually exercises 'control' over operation of the facility could remain a moot point.

Our consideration of the issues

We are working closely with ONR, assessing the company's development and its management arrangements. This is to help ensure that NNB GenCo (SZC) can meet the requirements of our permit conditions. NNB GenCo (SZC) made an application to ONR for a nuclear site licence shortly after it submitted its operational permit applications in 2020. We have also formally consulted ONR (and HSE) on both the initial application and our proposed decision. They have not raised any concerns regarding operator competence.

Assessment of compliance with environmental permits, once they are granted, takes many forms, including inspections on-site and of management arrangements, technical reviews of documentation and sampling of discharges. Our inspections may be pre-arranged or can be unannounced. So far, unannounced inspections have not been used in relation to Sizewell C, but these may be used in future should we judge them to be beneficial.

Regarding the potential for the shareholders of NNB Holding Company (SZC) Limited to change, NNB GenCo (SZC) will be the company holding the permit and will remain responsible for meeting the conditions imposed, irrespective of shareholder change in the NNB Holding Company (SZC) Limited. While NNB GenCo (SZC) and NNB GenCo (HPC) are separate companies with different shareholders, we expect NNB GenCo (SZC) to have appropriate governance, arrangements and agreements with NNB GenCo (HPC) to ensure that information regarding the design, construction, installation and operation of the plant can be shared between the 2 companies. Arrangements between NNB GenCo (SZC) and NNB GenCo (HPC) are already in place to ensure formal sharing of operational experience (OPEX) and we expect these to continue to share learning in future. We don't assume changes in the structure and ownership/shareholding of each of the companies involved in the application for the Sizewell permit would have no impact, but require NNB(GenCo) SZC, irrespective of parent company structure or ownership, to comply with the requirements of the permit.

The permit cannot be transferred to another company without a rigorous regulatory process being followed. Furthermore, the company that holds the permit is required by permit condition 4.3.3 (a) to notify us in advance of any changes to the company trading name, registered name or registered office as well as any changes in management system or resources which might be seen to have a significant impact on compliance with the permit (permit condition 4.3.4).

Brief summary of issues raised

Consultation and permitting process

- Concerns that the consultation we carried out on our proposed decisions was not genuine or not sufficient and that our final decision had already been made.
- A concern that our Habitats Regulations Assessment (HRA) reports had not been made publicly available.
- A concern that 'no authority or regulatory body appears to be solely responsible for anything, leading to many areas of concern just 'falling between the cracks'.
- A concern that the Environment Agency might not have sufficient resources to "robustly interrogate" information and data provided in NNB GenCo (SZC)'s application and its subsequent responses to requests for information. Also asked whether we consult ONR.

- Statement that the Regulators' Code should not apply to the Environment Agency in the matters of public health and environment.

Our consideration of the issues

The consultations we have carried out are genuine – we do not make and did not make any final decisions on the application before carefully considering all the responses to the consultations on the application and on the proposed decision document. We explained our role and the scope of our consultation in our proposed decision document. As outlined earlier in section 3.6 and earlier in this Appendix, we carried out extended consultations with the public and interested parties (including statutory consultees such as ONR) on NNB GenCo (SZC)'s application and our proposed decision in 2020 and 2022 respectively. We published our HRA report for all 3 permits as part of the latter consultation, so that these were made publicly available.

Our proposed decision document and its supporting documents set out our assessment of the application and why we proposed to grant a permit to NNB GenCo (SZC). The documents outlined our proposed decision to help inform consultees of our considerations, but we had not made any final decision. Before we made our final decision, we wanted to explain our thinking to the public and other interested parties, to give them an opportunity to understand that thinking and, if they wished, to make comments to us. We have made our final decision only after carefully considering relevant matters raised in the responses we received. We also stated in our proposed decision consultation that unless we receive information that leads us to alter the conditions in the draft permit, or to reject the application, we would grant the permit as included in the consultation. We have summarised the responses from both consultations and the issues raised in this section (Appendix 1) of the document and set out our views on those issues.

With regards to sufficient regulatory resource, we have carried out a thorough assessment of NNB GenCo (SZC)'s application and documented this, carried out 2 public consultations (and other public engagement activities) and fully considered and responded to the responses we received to both the application and our proposed decision consultation document. We have used adequate regulatory resources to do this work and are confident about the assessments we have carried out. The Regulators Code came into effect on 6 April 2014 under the Legislative and Regulatory Reform Act 2006 and applies to the Environment Agency. We consider that the Code promotes effective and proportionate regulation without in any way compromising our ability to regulate in a way which protects people and the environment.

Matters outside the Environment Agency's Combustion Activity permitting remit

Brief summary of issues raised

Wider environmental concerns

- Concerns over the wider environmental impact, including destruction and deterioration of natural habitats and protected sites during the development of the proposed power station.

- Concern was raised regarding the mitigation of entrainment of biota in the cooling water inlet and whether the acoustic fish deterrent specified for the Hinkley Point

EPRs would be required at Sizewell C. It was asked what yardsticks the Environment Agency uses in terms of tonnage of fish killed, acres of areas of outstanding natural beauty (AONB) destroyed, hours a day of noise and dust created, and potential impacts from coastal erosion before it would advise government that the development should be halted.

- It was queried when the Environment Agency would be consulting on other public interest environmental issues related to Sizewell C (for example, permitting associated with construction activities) and what they will be. Issues of concern listed included impact on fish stocks from water intake, loss of land and trees, infringement on AONB and SSSIs, impact on flora and fauna, access restrictions and damage to the surfing environment, footpath loss and reduction in access to countryside, sediment pollution, noise, light and dust pollution, particulate and CO2 increase from traffic, increased traffic during construction, assessment of the complete cradle to cradle lifecycle carbon footprint of the entire development, including all new infrastructure, desalination requirements and impacts, risk of pollutants entering pristine wildlife habitats, impact on water levels in the marshes and watercourses surrounding the site and potable water demand.

- Concerns over the loss of enjoyment of their garden a result of the development.

Our consideration of the issues

Many of the concerns and issues raised relate to matters which are subject to their own separate regulatory processes, some of which we regulate, while some are regulated by other organisations.

As outlined in chapter 1.4, we have carried out determination processes for NNB GenCo (SZC)'s water discharge activity and radioactive substances activity applications for the Sizewell C site. These are subject to their own separate regulatory tests of acceptability and the combined impacts of all 3 operational permits are considered in our Habitat Regulations Assessment (HRA) that accompanies this decision document and which can be found via our dedicated Sizewell pages on the GOV.UK website. NNB GenCo (SZC) will apply for further permits and licences from us in future for the construction phase of the station. These will be determined on a case-by-case basis within the relevant regulatory regime.

NNB GenCo (SZC) made an application in May 2020 for a Development Consent Order. This was subsequently granted by the Secretary of State in July 2022. NNB GenCo (SZC) has a dedicated website that provides information on its application and the DCO process, as well as the DCO application documents. The Planning Inspectorate also has its own portal for documents and information related to this process. The DCO process considered a wide range of environmental issues associated with the Sizewell C site and its related developments, including the types of issues raised by respondents.

Use of nuclear power

Brief summary of issues raised

- Statements that nuclear power was not an appropriate technology choice for energy generation.
- Suggestion that the money for Sizewell C would be better spent on insulating homes and businesses.
- The use of diesel generators demonstrates that nuclear power was not “green”.
- Support for the building and permitting of Sizewell C and that there was nothing wrong with having Sizewell C as an available source of energy generation.
- Suggestion that smaller facilities (small modular reactors) may be the future for nuclear energy.

Our consideration of the issues

Energy policy, including the use of nuclear power is a matter for government. Government published an Energy White Paper: ‘Powering our Net Zero Future’ in 2020 that set out the need for nuclear power, among other measures, to achieve net zero by 2050. In 2022, the government also published the British Energy Security Strategy that states an aim that by 2050, up to a quarter of the power consumed in Great Britain is from nuclear. Accordingly, in considering these consultation responses, we have also given due consideration to government policy on the future role of nuclear power in the UK.

Location of the regulated facility and impact on tourism

Brief summary of issues raised

- Requests the Environment Agency consider the impact of the project on the local tourism and hospitality industry. Tourists would no longer visit the area if the proposed development were to go ahead.
- A condition should be included in the permit that the local community should be compensated for high-level waste being stored in close proximity to local villages and towns.

Our consideration of the issues

Decisions about land use are matters for the land-use planning system. In the case of Sizewell C, this is mainly covered by the DCO process. As outlined above, NNB GenCo (SZC) made an application in May 2020 for a Development Consent Order and this was subsequently granted by the Secretary of State in July 2022. Information on the location of the facility is a relevant consideration for environmental permitting under EPR 2016 in relation to its potential to have an adverse environmental impact on members of the public or sensitive environmental receptors. The impact on members of the public and the environment has been assessed as part of the determination process and is reported on in section 4.5. Our consideration of a range of other legal powers and duties, which are not specific to permitting of radioactive substances activities, is set out in section 4.8. Where

those powers and duties relate to amenity and wellbeing issues, we considered whether additional conditions should be included in the permit and concluded that they should not.

Flood risk

Brief summary of issues raised

- Concerns about the flood risk of the site, particularly in relation to coastal erosion and sea level rise.
- Concerns about the suitability of the site given the potential impacts of climate change on the Sizewell coastline.
- Concern was raised about the long-term sustainability of the higher activity waste stores onsite.

Our consideration of the issues

We provided advice and guidance on flood risk in our consultation response relating to NNB GenCo (SZC)'s application to the planning inspectorate for a Development Consent Order. Our advice on these matters is normally accepted by both the applicant and the planning authority. The Office for Nuclear Regulation (ONR) considers flood risk as part of its regulation of nuclear licensed sites, which includes the storage of radioactive wastes. Flood risk and other external hazards is to be addressed as part of the safety case for the site developed by NNB GenCo (SZC). NNB GenCo (SZC) has applied to ONR for a nuclear site licence.

Decommissioning

Brief summary of issues raised

- Concerns about decommissioning of the Sizewell C station once it has ceased power generation. This included concerns over the cost of the decommissioning and how this would be met. Concerns were also raised about the progress of decommissioning and storage of waste at Sizewell A, with suggestion that the new station be built on the Sizewell A site once it was decommissioned.

Our consideration of the issues

Under the Energy Act 2008, operators of new nuclear power stations are required to have secure financing arrangements in place to meet the full costs of decommissioning and their full share of waste management and disposal costs. These arrangements are set out in a Funded Decommissioning Programme (FDP). The main parts of an FDP comprise:

- a Decommissioning and Waste Management Plan (DWMP), which sets out the operator’s costed plans for dealing with its liabilities (covering decommissioning, waste management and waste disposal). A plan will be reviewed and updated at least every 5 years and each updated plan will be independently verified
- a Funding Arrangements Plan (FAP), which sets out how the operator will make financial provision to meet its liabilities. It is in the form of a contract between the operator and the independent fund company that has been set up for the plant’s decommissioning and clean up. The FAP sets out the roles and responsibilities of

the fund and how payments to the fund will be calculated and explains how the priority of FDP payments is achieved over payments to investors

NNB GenCo (SZC) is currently working with the Department for Business, Energy and Industrial Strategy (BEIS) on the development of its FDP. The Environment Agency and the Office for Nuclear Regulation provide advice to BEIS on the technical credibility of the DWMP.

Sizewell A ceased power generation at the end of 2006, with its last nuclear fuel being transferred off-site to Sellafield in 2014. The site is operated by Magnox Ltd and is now undergoing a programme of decommissioning. The draft Nuclear Decommissioning Authority (NDA) Business Plan for 2022 to 2025 states that the decommissioning programme for the Magnox sites is currently under review, with the intention for Magnox to pursue site-specific decommissioning strategies, rather than a fleet-wide strategy of care and maintenance. However, it is highly unlikely that the Sizewell A site would become available for development and be compatible with the timescales planned for the Sizewell C development.

Accidents

Brief summary of issues raised

- Concerns about accidents that might occur once the reactors are operational.
- Concerns were also raised about the perceived lack of procedures in place to deal with such events.
- A concern about the Final Expert Statement from the Austrian Government, under the ESPOO Convention, on the Environmental Impact Assessment prepared to support the Development Consent Order. These questions were largely about emergency scenarios.

Our consideration of the issues

We consider and grant permits for normal operations, including the potential for some reasonably foreseeable events to occur during the operating life of the reactor, typically over a 60-year period.

The Office for Nuclear Regulation (ONR) regulates the safety of reactors, including the assessment of incident and emergency scenarios. In June 2022, ONR responded to the recommendations from the Austrian Government Expert Statement's in a letter to the Secretary of State for Business, Energy & Industrial Strategy.

Operators and local authorities are required to develop Emergency Plans where applicable under the Radiation (Emergency Preparedness and Public Information) Regulations 2019. The Suffolk Joint Emergency Planning Unit on behalf of Suffolk County Council/Suffolk Resilience Forum has prepared a Radiation Emergency Plan to meet this requirement.

The responses to our consultation regarding accidents and other matters relating to their regulatory remit have been shared with ONR for its consideration.

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