Document Reference 101254844
Revision 01

Sizewell C
The power of good for Britain

Sizewell C Project

Combustion Activity Permit Application

Appendix K: Construction Permitting Habitats Regulations Assessment (HRA) Report

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REVISION HISTORY

Rev	Status	Amendment	Prepared By	Date
01	Final	First Draft	[redacted]	11/04/2024

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1 INTRODUCTION

1.1 Overview

1.1.1 The Sizewell C Project ('SZC Project') is a consented nuclear power station[1]. It will consist of two UK European Pressurised Reactors™ which will be immediately north of the existing Sizewell B power station in Suffolk. The Secretary of State's (SoS) Habitats Regulations Assessment (HRA)[2] (hereafter referred to as the 'SoS HRA') records their decision on the potential for adverse effects on the integrity of European and Ramsar sites as a result of the SZC Project. The SoS HRA was informed by the evidence submitted by Sizewell C Ltd (SZC) in its Shadow HRA (sHRA). The SoS HRA therefore records the position with regard to effects on European and Ramsar sites as a consequence of the construction and operation of the SZC Project, and all construction permit applications will be considered and assessed in light of the conclusions of the SoS HRA. A Countryside Rights of Way (CRoW) Act Review has also been undertaken for Sites of Special Scientific Interest (SSSI) which is included as an Annex to this HRA.

1.1.2 Certain works and construction activities as a part of this project, require environmental permits. These include but are not limited to water discharges, realignment of channels and other construction activities. A HRA is required to support the permit applications where these are identified as having a risk of an effect on European or Ramsar sites.

1.1.3 This HRA Report provides information to inform permit applications regarding the emissions and disturbance impacts associated with the standby diesel generators, having regard to the outcome of the SoS HRA, as explained above. Potential effects associated with the proposed activities relevant to construction permits were taken into account within the SoS HRA. Consequently, and as explained above, the assessment for this permit (and all construction permits) is undertaken with cognisance of the outcome of the SoS HRA but reflecting the (inevitable) greater degree of resolution on the activities relevant to each permit that is now available. The air quality modelling data discussed in this report are contained in the separate Air Quality Modelling Report, while isopleth maps discussed in this report are presented in the appendices to this document.

1.2 Legislative Framework

1.2.1 As part of the assessment of a proposed activity it is necessary to consider whether the activity is likely to have a significant effect (LSE) on European and Ramsar sites (also known as Habitats Site and forming part of the National Site Network).

1.2.2 Should it be found that significant effects are likely (or cannot be excluded), an 'Appropriate Assessment' must then be carried out in order to further assess those effects. Plate 1 below sets out the legislative basis for an Appropriate Assessment. Consent may only be given if, following assessment, it is established that it will not adversely affect the integrity of the designated site.

1.2.3 If, taking into account any mitigation measures, adverse effects are identified, alternatives should be considered to avoid those effects. However, where no alternative solution exists and so an adverse effect remains, a further assessment should be made of whether the scheme is required for imperative reasons of overriding public

[1] The Sizewell C (Nuclear Generating Station) Order 2022. Available online at: https://www.legislation.gov.uk/uksi/2022/853/contents/made. [Accessed 28/02/2024]
[2] Secretary of State (Department for Business, Energy and Industrial Strategy) (2022). Habitats Regulations Assessment for an Application Under the Planning Act 2008: Sizewell C New Nuclear Power Station. Available online at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010012/EN010012-011167-SZC-HRA.pdf. [Accessed 28/02/2024]

interest (IROPI). If the scheme meets that IROPI test, compensatory measures will be required in order to maintain the overall national site network.

1.2.4 The need for an Appropriate Assessment is set out in the Conservation of Habitats and Species Regulations 2017 (as amended) (the 2017 Regulations). The 2017 Regulations also apply the precautionary principle[3] to European Sites.

> **Conservation of Habitats and Species Regulations 2017 (as amended)**
>
> Regulation 63 of the 2017 Regulations states that:
>
> "*A competent authority, before deciding to … give any consent for a plan or project which is likely to have a significant effect on a European site … must make an appropriate assessment of the implications for the plan or project in view of that site's conservation objectives… The competent authority may agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the European site.*"

Plate 1. The Legislative basis for Appropriate Assessment

1.2.5 Over the years, the phrase 'Habitats Regulations Assessment' (HRA) has come into wide currency to describe the overall process set out in the 2017 Regulations, from the screening for Likely Significant Effects through to identification of IROPI. This has arisen in order to distinguish the overall process from the individual stage of "Appropriate Assessment". Throughout this HRA Report the term HRA is used for the overall process and restricts the use of Appropriate Assessment to the specific stage of that name.

1.2.6 Since the proposed activity is not directly connected with, or necessary to, the management of any part of the National Site Network, the first step in the HRA process is to determine whether the proposed activity is likely to have a significant effect on any Special Area of Conservation (SAC), Special Protection Area (SPA) or Ramsar site. If a likely significant effect exists, then an appropriate assessment must be undertaken of the effects of the activity on the integrity of such sites.

1.3 Definitions

Term / Abbreviation	Definition
ADs	Associated Developments
AERA	Air Emission Risk Assessment
APIS	Air Pollution Information System
CRoW Act	Countryside Rights of Way Act
DCO	Development Consent Order (DCO)
EW	Early Works
EA	Environment Agency
HRA	Habitats Regulations Assessment

[3] The Precautionary Principle, which is referenced in Article 191 of the Treaty on the Functioning of the European Union, has been defined by the United Nations Educational, Scientific and Cultural Organisation (UNESCO, 2005) as: *"When human activities may lead to morally unacceptable harm [to the environment] that is scientifically plausible but uncertain, actions shall be taken to avoid or diminish that harm. The judgement of plausibility should be grounded in scientific analysis".*

Term / Abbreviation	Definition
IROPI	Imperative Reasons of Overriding Public Interest
kgN/ha/yr	(kilograms) of nitrogen over a given area (hectare) per year
LSE	Likely Significant Effect
MWth	Megawatt Thermal
NH_3	Ammonia
NRMM	Non Road Mobile Machinery
NOx	Oxides of Nitrogen
PC	Process Contribution
PEC	Predicted Environmental Concentration
SSSI	Sites of Special Scientific Interest
SZC	Sizewell C Ltd
SZC Project	Sizewell C Project
SAC	Special Area of Conservation
sHRA	Shadow Habitats Regulations Assessment
SPA	Special Protection Area
SO_2	Sulphur Dioxide
SACO	Supplementary Advice on the Conservation Objectives
SoS HRA	The Secretary of State's Habitats Regulations Assessment

2 PERMIT DETAILS AND DESCRIPTION

2.1.1 The permit associated is for an installation activity environmental permit, EPR Schedule 1, Section 1.1A(1)(a): Burning of any fuel in an appliance with a rated thermal input of 50 MW or more. This will be Permit MDS/CAP/1. Three scenarios have been assessed in this HRA:

- **Early Works (EW) Scenario 1A 2024**: generators for welfare and general construction needs, use and relevant Associated Developments (ADs) for 2024. The modelled results for this scenario are presented in in the Air Emission Risk Assessment (AERA) (Appendix C of the Supporting Information Document) within Appendix C. Within the AERA this is referred to as ***Early Works 2024***.
- **EW Scenario 1A 2025:** generators for welfare and general construction needs, use and relevant ADs for 2025. The modelled results for this scenario are presented in the AERA within Appendix C. Within the AERA this is referred to as ***Early Works 2025***.
- **Peak Construction Scenario 2E**: package substations with hybrid/battery use with 50 Megawatt Thermal (MWth) power demand and relevant ADs generators. This scenario represents the reasonable worst-case scenario and forms the basis of the Air Quality Assessment submitted with the permit application. The modelled results for this scenario are presented in in AERA, this is referred to as '***Scenario 1***' in the modelling report.

2.1.2 The analysis presented in this HRA Report draws upon the modelling work presented in the AERA (Appendix C of the Supporting Information Document).

3 SCREENING FOR LIKELY SIGNIFICANT EFFECTS

3.1 Introduction

3.1.1 The purpose of screening is to determine whether or not the permit under consideration could have a likely significant effect (LSE), either alone or in combination with other projects or plans, on any European or Ramsar site as a result of its implementation. The LSE test is taken as a 'trigger'[4] and identifies whether the greater scrutiny of an 'appropriate assessment' is necessary.

3.1.2 Screening establishes whether there is a pathway between the possible impacts of the activity and the likely significant effect they may have on the qualifying interest features of any European or Ramsar sites, having regard to the Conservation Objectives of those sites. Where there are no pathways to effect, they are not considered further. Where a pathway is identified, consideration is then given to whether LSE may arise.

3.1.3 There are four steps of screening, as set out within European Commission guidance as provided below.

3.2 Step 1 Determining if the plan or project is directly connected with or necessary for the management of the European (or Ramsar) Site

3.2.1 Permit MDS/CAP/1 (comprising a 'plan' or 'project'; for the purposes of HRA considerations) is not directly connected with, or necessary for, the management of any European Site and as such, it is necessary to undertake HRA.

3.3 Step 2 Describing the plan or project

3.3.1 A description of the permit, and associated activities, is presented within **Section 2** of this HRA Report.

3.4 Step 3 Identifying the potential effects on European (or Ramsar) Sites

3.4.1 There is specific detailed guidance on identifying potential effects from combustion permits produced by the Environment Agency (EA). Ecological receptors were identified following the EA's guidance[5] which states that any SAC, SPA or Ramsar sites within 10km need to be considered.

3.4.2 In accordance with the distance-based screening undertaken by the EA for this consent the following European and Ramsar sites are identified:

- Minsmere to Walberswick Heaths and Marshes SAC (adjacent to the permit location).
- Minsmere-Walberswick SPA and Ramsar site (adjacent to the permit location);
- Sandlings SPA (0.23km from the permit location);
- Outer Thames Estuary SPA (adjacent to the permit location);
- Alde-Ore Estuary SPA/Alde-Ore and Butley Estuaries SAC (5km from the

[4] Scottish Courts and Tribunals (2012). *Bagmoore Wind Limited v The Scottish Ministers*. (CSIH 93). Available at: https://www.scotcourts.gov.uk/search-judgments/judgment?id=f18a86a6-8980-69d2-b500-ff0000d74aa7.

[5] Air emissions risk assessment for your environmental permit - GOV.UK (www.gov.uk)

- Orfordness-Shingle Street SAC (7.8km from the permit location).

3.4.3 Southern North Sea SAC, and Dews Pond SAC are all within 10km of the SZC site but do not have any air quality sensitive features. The Southern North Sea SAC is designated for its marine Annex II species (harbour porpoise). Dew's Pond SAC is designated for its population of great crested newt, which have terrestrial habitat requirements. However, this species has very broad habitat requirements (being found in a wide range of densely vegetated and sparsely vegetated habitats) and air quality impacts on vegetation will not materially affect the ability of the SAC to support its great crested newts. It is therefore excluded from the scope of this assessment. It should also be noted that the Outer Thames Estuary SPA is brought forward for assessment in relation to the risk of disturbance only. The SPA is designated for its foraging terns and whilst tern nesting habitat is sensitive to atmospheric pollution tern marine foraging habitat is not sensitive.

3.4.4 Section 4 below sets out the details of the European sites considered further in this assessment.

3.5 Step 4 Assessing the potential for Likely Significant Effects on European (or Ramsar) Sites

3.5.1 Section 5 below sets out the test of LSE. The process considers whether the Predicted Environmental Concentration (PEC) will exceed the critical level (for pollutants in atmosphere) or critical load (for pollutant deposition). It also considers whether the process contribution (either alone or in combination with other plans and projects) with the '1% of the critical level/load' threshold that is used for screening sources of pollution.

4 RELEVANT EUROPEAN SITES

4.1.1 The HRA must assess the specific interest features of each European site and must be undertaken in view of the site's conservation objectives. This section of the report therefore sets out the qualifying interest features and conservation objectives of every European site assessed. It also sets out the publicly identified threats and pressures to each site, including whether air quality or disturbance is identified as a threat or pressure, as noted in the site improvement plan for each site.

4.2 Minsmere to Walberswick Heaths and Marshes SAC

Conservation Objectives

4.2.1 The conservation objectives of the Minsmere to Walberswick Heaths and Marshes SAC are:

"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 habitats*
- *The structure and function (including typical species) of qualifying natural habitats, and*
- *The supporting processes on which qualifying natural habitats rely"*

Qualifying Features

4.2.2 The site qualifies due to the presence of the following Annex I habitats:

- 1210 Annual vegetation of drift lines
- 4030 European dry heaths
- 1220 Perennial vegetation of stony banks

Threats and pressures

4.2.3 The site improvement plan[6] identifies the following threats and pressures to the SAC:

- Coastal squeeze
- Public access/disturbance
- Changes in species distribution
- Invasive species
- Inappropriate pest control
- Air Pollution: impact of atmospheric nitrogen deposition
- Water pollution
- Deer

[6] Site Improvement Plan: Minsmere to Walberswick Heaths and Marshes - SIP139 (naturalengland.org.uk)

- Fisheries: commercial marine and estuarine

4.3 Minsmere-Walberswick SPA

Conservation Objectives

4.3.1 The conservation objectives of the Minsmere-Walberswick SPA are:

"With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified (the 'Qualifying Features' listed below), and subject to natural change;

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure 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*
- *The structure and function of the habitats of the qualifying features*
- *The supporting processes on which the habitats of the qualifying features rely*
- *The population of each of the qualifying features, and,*
- *The distribution of the qualifying features within the site."*

Qualifying Features

4.3.2 During the breeding season the area:

Qualifies under Article 4.1, by supporting, in summer, nationally important breeding populations of the following Annex 1 species:

- Bittern *Botaurus stellaris* (breeding);
- Marsh harrier *Circus aeruginosus* (breeding);
- Avocet *Recurvirostra avosetta* (breeding);
- Little tern *Sternula albifrons* (breeding); and
- Nightjar *Caprimulgus europaeus* (breeding).

Qualifies under Article 4.1 by regularly supporting, in winter, a nationally important wintering population of:

- Hen harrier *Circus cyaneus* (non-breeding).

Qualifies under Article 4.2 by supporting, in summer, in recent years, nationally important breeding populations of three regularly occurring migratory species:

- Eurasian teal *Anas crecca* (breeding);
- Gadwall *Anas strepera* (breeding);
- Shoveler *Anas clypeata* (breeding)

Qualifies under Article 4.2 by supporting nationally important wintering populations of three migratory waterfowl:

- Greater white-fronted goose *Anser albifrons albifrons* (non-breeding);
- Gadwall (non-breeding); and
- Shoveler (non-breeding).

Threats and pressures

4.3.3 The site improvement plan[7] identifies the following threats and pressures to the SAC (note that these are identical to those for the SPA because a single site improvement plan covers both designations):

- Coastal squeeze
- Public access/disturbance
- Changes in species distribution
- Invasive species
- Inappropriate pest control
- Air pollution: impact of atmospheric nitrogen deposition
- Water pollution
- Deer
- Fisheries: commercial marine and estuarine

4.4 Minsmere-Walberswick Ramsar site

Conservation Objectives

4.4.1 Ramsar sites do not have specific Conservation Objectives but since the interest features are very similar to the SPA (noting that habitats, plants and invertebrates are also Ramsar qualifying criteria in addition to birds), the conservation objectives for the SPA are taken to apply to the Ramsar site as well, as stated in Section 3.2.1.

Qualifying Features

4.4.2 Ramsar criterion 1

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

4.4.3 Ramsar criterion 2

This site supports nine nationally scarce plants and at least 26 red data book invertebrates. It supports a population of the mollusc *Vertigo angustior* (Habitats Directive Annex II; British Red Data Book Endangered), recently discovered on the Blyth estuary river walls. An important assemblage of rare breeding birds

[7] Site Improvement Plan: Minsmere to Walberswick Heaths and Marshes - SIP139 (naturalengland.org.uk)

associated with marshland and reedbeds including: *Botaurus stellaris*, *Anas strepera*, *Anas crecca*, *Anas clypeata*, *Circus aeruginosus*, *Recurvirostra avosetta* and *Panurus biarmicu.*

Threats and pressures

4.4.4 The site improvement plan[8] for the SPA and SAC that cover the same area as the Ramsar identifies the following threats and pressures:

- Coastal squeeze
- Public access/disturbance
- Changes in species distribution
- Invasive species
- Inappropriate pest control
- Air pollution: impact of atmospheric nitrogen deposition
- Water pollution
- Deer
- Fisheries: commercial marine and estuarine

4.4.5 The Ramsar information sheet[9] identifies the following conservation issues:

- The Countryside Stewardship scheme (see UK introductory section) is active in the area.
- English Nature has management agreements and leases with a number of landowners.
- The site requires and receives intensive management in order to maintain its values.
- The site is very vulnerable to damage from external forces, including groundwater abstraction, coastal erosion and salt water incursion due to sea-level rise, pollution from sewage treatment works and increasingly high numbers of visitors to the area.

4.5 Sandlings SPA

Conservation Objectives

4.5.1 The conservation objectives of the Sandlings SPA are:

"With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified (the 'Qualifying Features' listed below), and subject to natural change;

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure 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*
- *The structure and function of the habitats of the qualifying features*

[8] Site Improvement Plan: Minsmere to Walberswick Heaths and Marshes - SIP139 (naturalengland.org.uk)

[9] UK010D93 (ramsar.org)https://publications.naturalengland.org.uk/publication/5674608288071680

- *The supporting processes on which the habitats of the qualifying features rely*
- *The population of each of the qualifying features, and,*
- *The distribution of the qualifying features within the site."*

Qualifying Features

4.5.2 The site qualifies as it is used regularly by over 1% of the Great Britain populations of the following Annex I species:

- Nightjar, *Caprimulgus europaeus*
- Woodlark, *Lullula arborea*

Threats and pressures

4.5.3 The site improvement plan[10] identifies the following threats and pressures to the SPA:

- Changes in species distribution
- Inappropriate scrub control
- Deer
- Air pollution: impact of atmospheric nitrogen deposition
- Public access/disturbance

4.6 Alde-Ore & Butley Estuaries SAC

Conservation Objectives

4.6.1 The conservation objectives of the Alde-Ore & Butley Estuaries SAC are:

"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*
- *The structure and function (including typical species) of qualifying natural habitats, and*
- *The supporting processes on which qualifying natural habitats rely"*

Qualifying Features

4.6.2 The site is designated for its:

- Estuaries
- Mudflats and sandflats not covered by seawater at low tide.
- Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*).

[10] Site Improvement Plan: Sandlings - SIP210 (naturalengland.org.uk)

Threats and pressures

4.6.3 The site improvement plan[11] identifies the following threats and pressures to the SAC:

- Hydrological changes
- Public access/disturbance
- Inappropriate coastal management
- Coastal squeeze
- Inappropriate pest control
- Changes in species distributions
- Invasive species
- Air pollution
- Fisheries: commercial marine and estuarine

4.7 Alde-Ore Estuary SPA

Conservation Objectives

4.7.1 The conservation objectives of the Alde-Ore Estuary SPA are:

"With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified (the 'Qualifying Features' listed below), and subject to natural change;

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure 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*
- *The structure and function of the habitats of the qualifying features*
- *The supporting processes on which the habitats of the qualifying features rely*
- *The population of each of the qualifying features, and,*
- *The distribution of the qualifying features within the site."*

Qualifying Features

4.7.2 The site qualifies as it is used regularly by over 1% of the Great Britain populations of the following Annex I species:

- Avocet (*Recurvirostra avosetta*), Breeding
- Avocet (*Recurvirostra avosetta*), Non-breeding
- Lesser black-backed gull (*Larus fuscus*), Breeding
- Little tern (*Sternula albifrons*), Breeding

[11] Site Improvement Plan: Alde-Ore Estuaries - SIP002 (naturalengland.org.uk)

- Marsh harrier (*Circus aeruginosus*), Breeding
- Redshank (*Tringa totanus*), Non-breeding
- Ruff (*Calidris pugnax*), Non-breeding
- Sandwich tern (*Thalasseus sandvicensis*), Breeding

Threats and pressures

4.7.3 The site improvement plan[12] identifies the following threats and pressures to the SPA:

- Hydrological changes
- Public access/disturbance
- Inappropriate coastal management
- Coastal squeeze
- Inappropriate pest control
- Changes in species distributions
- Invasive species
- Air pollution
- Fisheries: commercial marine and estuarine

4.8 Ordfordness-Shingle Street SAC

Conservation Objectives

4.8.1 The conservation objectives of the Ordfordness-Shingle Street SAC are:

"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*
- *The structure and function (including typical species) of qualifying natural habitats, and*
- *The supporting processes on which qualifying natural habitats rely"*

Qualifying Features

4.8.2 The site supports the following:

- Coastal lagoons
- Annual vegetation of drift lines
- Perennial vegetation of stony banks

[12] Site Improvement Plan: Alde-Ore Estuaries - SIP002 (naturalengland.org.uk)

Threats and pressures

4.8.3 The site improvement plan[13] identifies the following threats and pressures to the SAC (note the same site improvement plan covers both this SAC and Alde-Ore Estuaries):

- Hydrological changes
- Public access/disturbance
- Inappropriate coastal management
- Coastal squeeze
- Inappropriate pest control
- Changes in species distributions
- Invasive species
- Air pollution
- Fisheries: commercial marine and estuarine

4.9 Outer Thames Estuary SPA

Conservation Objectives

4.9.1 The conservation objectives of the Outer Thames Estuary SPA are:

"With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified (the 'Qualifying Features' listed below), and subject to natural change;

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure 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

The structure and function of the habitats of the qualifying features

The supporting processes on which the habitats of the qualifying features rely

The population of each of the qualifying features, and,

The distribution of the qualifying features within the site."

Qualifying Features

4.9.2 The site supports the following:

- Common tern *Sterna hirundo* (breeding)
- Little tern (breeding); and
- Red-throated diver Gavia stellata (non-breeding).

[13] Site Improvement Plan: Alde-Ore Estuaries - SIP002 (naturalengland.org.uk)

Threats and Pressures

4.9.3 The site improvement plan[14] identifies the following threats and pressures to the SPA:

- Aggregate extraction
- Construction of renewable energy developments
- Shipping lanes
- Marine Pollution
- Fishing Activities

[14] Site Improvement Plan: Alde-Ore Estuaries - SIP002 (naturalengland.org.uk)

5 LIKELY SIGNIFICANT EFFECTS

5.1 Noise impacts

5.1.1 The Special Areas of Conservation scoped in for assessment (Minsmere to Walberswick Heaths and Marshes SAC, Alde-Ore and Butley Estuaries SAC and Orfordness-Shingle Street SAC, refer to paragraph 3.4.1.2) are designated for their Annex I habitats only and as such there is no impact-effect pathway and Likely Significant Effects can be excluded beyond reasonable scientific doubt.

5.1.2 Alde-Ore Estuary SPA, the Outer Thames Estuary SPA and Sandlings SPA are located c.500m from the nearest generator location, beyond the expected zone of influence for noise impacts associated with the generator. Likely Significant Effects alone or in-combination can be excluded beyond reasonable scientific doubt.

5.1.3 Minsmere-Walberswick SPA/Ramsar site is located in closer proximity to some generator locations and as such there is potential for noise impacts during the operation of the generator to result in Likely Significant Effects on the qualifying bird interest features of these sites, namely Marsh Harrier and/or gadwall or shoveler, which may be present within the zone of influence of the noise impacts. This is considered further in Section 6 'Information to Inform Appropriate Assessment'.

5.2 Air quality impacts: Relevant pollutants and assessment thresholds

5.2.1 There are two broad mechanisms for atmospheric pollutant impact which are modelled using standard forecasting. The first is the concentration of pollutants in the atmosphere, in this case specifically oxides of nitrogen (known as NOx), ammonia (NH_3), and sulphur dioxide (SO_2). At high concentrations Nox can be directly toxic to vegetation but its main importance is as a source of nitrogen, which is then deposited on adjacent habitats[15]. Ammonia can be directly toxic to vegetation in relatively low concentrations, particularly to lower plants (lichens and bryophytes).

5.2.2 The second important set of pollutants is a measure of the rate of the resulting nitrogen (and acid, where relevant) deposition. The addition of nitrogen is a form of fertilization, which can have a negative effect on most habitats over long time periods in particular by encouraging more competitive plant species that can force out the less competitive species that are more characteristic. Unlike NOx in atmosphere, the nitrogen and acid deposition rate below which there is confidence effects would not arise is different for each habitat. The rate (known as the critical load) is provided on the UK Air Pollution Information System (APIS) website (www.apis.ac.uk) and is expressed as a quantity (kilograms) of nitrogen over a given area (hectare) per year (kgN/ha/yr).

5.2.3 To identify sensitivity thresholds for vegetation a system of critical levels (for pollutants in atmosphere) and critical loads (for the resulting nitrogen and acid deposition) have been devised. These are defined as follows[16]:

- Critical loads are defined as: "*a quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge".*

[15] For example, the APIS website states that *'It is likely that the strongest effect of emissions of nitrogen oxides across the UK is through their contribution to total nitrogen deposition…'* http://www.apis.ac.uk/overview/pollutants/overview_NOx.htm

[16] https://www.icpmapping.org/Definitions_and_abbreviations

- Critical levels are defined as "*concentrations of pollutants in the atmosphere above which direct adverse effects on receptors, such as human beings, plants, ecosystems or materials, may occur according to present knowledge".*

5.2.4 Where the critical level or critical load are exceeded the following considerations are relevant in ecological interpretation[17]:

- Paragraph 5.26 of Natural England guidance on the issue states that '*An exceedance* [of the critical level or load] *alone is insufficient to determine the acceptability (or otherwise) of a project'.* Therefore, the fact that the critical level or critical load is already exceeded is not a legitimate basis to conclude that any further pollution (no matter how small) will result in an adverse effect;
- Paragraph 4.25 of the same Natural England guidance states '*…1% of critical load/level are considered by Natural England's air quality specialists (and by industry, regulators and other statutory nature conservation bodies) to be suitably precautionary, as any emissions below this level are widely considered to be imperceptible…There can therefore be a high degree of confidence in its application to screen for risks of an effect'.* The '1% of the critical level/load' criterion is therefore a commonly used initial screening threshold and is used as such in this HRA Report. Note that for short-term (24hr) Nox a 10% of the critical level screening threshold is used, reflecting that long-term exposure to Nox is likely a greater risk to designated sites than short term exposure.

5.2.5 At the same time, Natural England guidance makes it clear that exceedance of these thresholds does not automatically mean an adverse effect on integrity will arise. Paragraph 5.28 of that guidance states '*In practice, where a site is already exceeding a relevant benchmark, the extent to which additional increments from plans and projects would undermine a conservation objective to 'restore'* [or maintain, although this is not specifically stated] *will involve further consideration of whether there is credible evidence that the emissions represent a real risk that the ability of other national or local measures and initiatives to otherwise reduce background* [pollutant] *levels will be compromised in a meaningful manner'.* This will include consideration of factors such as the duration of exposure, the magnitude of exposure and how pollution affects the functioning of the habitats.

5.2.6 The Environment Agency guidance previously cited includes a criterion as to whether the Predicted Environmental Concentration (PEC) (i.e. the Process Contribution (PC) for the activity being assessed, plus the background pollution, plus any other relevant sources of pollution not yet reflected in the background) exceeds 20% (for short term) or 70% (for long term) of the critical level or critical load. However, this criterion is not a damage threshold; it is simply an indicator that detailed dispersion modelling is required. In this case such modelling has already been undertaken so the 70% threshold is not relevant to ecological interpretation.

5.2.7 In the air quality modelling undertaken for this HRA Report, separate PCs have been calculated for the generators (for which a permit is being sought) and, in order to meet the legal requirement to consider impacts 'in combination' with other sources of emission, for the Non Road Mobile Machinery (NRMM) and the construction traffic for the SZC project as a whole. These have therefore been summed to provide an 'in combination' PC. When combined with the background concentrations or deposition rates they provide the PEC.

5.2.8 Note that in the Air Quality Modelling Report that forms Appendix C of the Supporting Information Document acid deposition is reported as either 'not applicable' (as not all European sites have applicable critical loads for acidity) or 'No PC Exceedances' for each receptor. Therefore acidity is not discussed further in this report which focusses on Nox, ammonia and nitrogen deposition.

[17] Taken from 'Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations. Version: June 2018': http://publications.naturalengland.org.uk/publication/4720542048845824.

5.3 Appropriate critical levels and critical loads

5.3.1 Critical levels for Nox and SO_2 are fixed and applicable to all habitats: 30 μgm^{-3} for annual Nox, 20 μgm^{-3} for annual SO_2, and 75 μgm^{-3} for short-term (24hr) Nox. The appropriate critical level for ammonia depends on whether lichens or bryophytes of relevance to the conservation status of the habitat are likely to be present. If they are an important part of the ecosystems integrity then a more stringent critical level of 1 μgm^{-3} is appropriate. If they are unlikely to be present or are not an interest of the designated site then a higher critical level of 3 μgm^{-3} is appropriate. For the purposes of the air quality modelling to support this permit, the more stringent critical level has been used throughout. However, in the ecological interpretation presented below the appropriateness of the lower critical level has been reviewed based on the habitat present in the affected area.

5.3.2 Critical loads for nitrogen and acid deposition vary from habitat to habitat. Reference has been made to the UK APIS and its Site Relevant Critical Load app for the SACs/SPAs/Ramsars mentioned below. This has been combined with knowledge about the distribution of habitats on the site and how their function and/or use by qualifying species may be affected by pollution, a level of detail that is not contained on APIS which is not tailored to specific designated sites. The appropriate critical load has been discussed below.

E1 – Alde-Ore Estuary SPA and Alde-Ore and Butley Estuaries SAC

At this SAC/SPA, saltmarsh is identified on APIS as the only sensitive habitat. The lowest critical load for saltmarsh of 10 kgN/ha/yr has therefore been used in the modelling and interpretation as a precaution. Saltmarsh does not have a significant lichen or bryophyte flora so the appropriate critical level for ecological interpretation is 3 μgm^{-3}.

E2 – Minsmere-Walberswick Heaths & Marshes SAC and Minsmere-Walberswick SPA/Ramsar

Special Area of Conservation

5.3.3 The most sensitive habitats for which the SAC is designated are heathland and 'perennial vegetation of stony banks'. According to www.magic.gov.uk the nearest area of heathland in the SAC is approximately 3km north of the SZC site with most heathland being more than 3.6km from the SZC site. The location of the nearest area of perennial vegetation of stony banks is not mapped on MAGIC, but submissions made by RSPB and Suffolk Wildlife Trust to the SZC Development Consent Order (DCO) Examination[18] noted that this habitat existed on the foreshore within 100m north of the SZC site. The lowest part of the nitrogen critical load range for heathland and perennial vegetation of stony banks is 5 kgN/ha/yr. Heathlands can support diverse lichen communities and therefore a precautionary ammonia critical level of 1 μgm^{-3} has been used to allow for the potential presence of lower plants.

Special Protection Area/Ramsar

5.3.4 Most of the birds for which the SPA/Ramsar is designated make use of fen, marsh and swamp, which has a critical load of 15 kgN/ha/yr[19]. This includes marsh harrier and hen harrier, which on APIS for this SPA are both associated with the critical load for rich fens (since this is the critical load assigned on APIS to 'fen, marsh and swamp'). The SPA/Ramsar is also designated for breeding little tern and nightjar. Little tern uses stony shingle and scrapes for nesting (rather than heavily vegetated fixed sand dunes as are present north of the SZC site)

[18] EN010012-005529-DL3 - Royal Society for the Protection of Birds RSPB and Suffolk Wildlife Trust Comments on Other D2.pdf (planninginspectorate.gov.uk)

[19] Although APIS identifies saltmarsh and lowland meadow as a habitat associated with several SPA species there are no significant areas of these habitats in the SPA according to MAGIC or work or the DCO

while nightjar use heathland in particular. It was established for the DCO that the closest little tern colony to the main SZC development site (at approximately 1.5km) is at Minsmere. In 2019 ten pairs bred on a specially created scrape at that location. Since the scrape habitat is deliberately managed to keep vegetation down nitrogen deposition will not materially affect its ability to support its tern interest. Heathland has a critical load of 5kgN/ha/yr. According to MAGIC the closest area of heathland within the SPA/Ramsar is located approximately 3km north of the SZC site. Lower plants are not important for the persistence of SPA/Ramsar features and therefore a higher ammonia critical level of 3 μgm^{-3} is appropriate.

E3 – Orfordness-Shingle Street SAC

5.3.5 The air quality sensitive features of this SAC are the 'perennial vegetation of stony banks' and the coastal lagoons. The lowest critical load for coastal vegetated shingle of 5 kgN/ha/yr has therefore been used in modelling, as has a precautionary ammonia critical level of 1 μgm^{-3} to allow for the potential presence of lower plants.

E4 – Sandlings SPA

Sandlings SPA is designated for breeding nightjar and woodlark. The most sensitive habitat for those species in the SPA is heathland with a nitrogen critical load of 5kgN/ha/yr. While heathland can support a diverse lichen/bryophyte flora, its ability to do so does not affect its ability to support nightjar or woodlark. Therefore for ammonia it is considered that the appropriate critical level for ecological interpretation of impacts on the SPA is 3 μgm^{-3}.

5.3.6 The remainder of this section discusses the air quality modelling results. It is organised by modelled scenario, then by designated site. Each pollutant is discussed in turn.

5.4 Modelled outcome: Scenario 1A 2024

Receptor E1: Alde-Ore Estuary SPA/Alde-Ore and Butley Estuaries SAC

NOx

5.4.1 The critical level is not forecast to be exceeded by the PEC for either annual or short-term Nox even when all sources of Nox are modelled 'in combination' (i.e. not just the generators). For annual Nox the PEC is forecast to be 21.7% of the critical level while for short-term Nox it is forecast to be 10.4% of the critical level. The total (in combination) PC is also forecast to be less than 1% of the critical level for annual Nox and less than 10% of the critical level (24hr Nox), being 0.2% and 1.4% of the critical level respectively.

5.4.2 Since the critical level will not be exceeded even 'in combination' and the 'in combination' PC will not exceed 1% (or 10% for short-term Nox) of the critical level, no likely significant effect will arise from Nox in atmosphere.

SO_2

5.4.3 The critical level for sulphur dioxide is not forecast to be exceeded by the PEC even when all sources of sulphur dioxide are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 11.1% of the critical level. Moreover, the 'in combination' total PC is well below 1% of the critical level being less than 0.1% of the critical level (i.e. so low it does not show in the model to 2 decimal places).

5.4.4 Since the critical level will not be exceeded even 'in combination' and the 'in combination' PC will not exceed 1% of the critical level, no likely significant effect will arise from sulphur dioxide in atmosphere.

Ammonia

5.4.5 Using a critical level of 3 μgm^{-3} appropriate for saltmarsh, the critical level is not forecast to be exceeded by the PEC even when all sources of ammonia are modelled 'in combination' (i.e. not just the generators), with the

PEC forecast to be 46% of the critical level (1.38 μgm^{-3}). Moreover, the 'in combination' total PC is well below 1% of the critical level being less than 0.1% of the critical level.

5.4.6 Since the critical level will not be exceeded even 'in combination' and the 'in combination' PC will not exceed 1% of the critical level for the most appropriate habitat, no likely significant effect will arise from ammonia in atmosphere.

Nitrogen

5.4.7 The critical load for saltmarsh (10 kgN/ha/yr) is forecast to be exceeded by the PEC even when all sources of nitrogen are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 127.7% of the critical load (12.77 kgN/ha/yr). However, the 'in combination' total PC is well below 1% of the critical load being 0.3% of the critical load.

5.4.8 Since the 'in combination' PC will not exceed 1% of the critical load for the most appropriate habitat, no likely significant effect will arise notwithstanding that the critical load will not be exceeded even 'in combination'.

Summary

5.4.9 No likely significant effect on this European site will arise alone or in combination with other projects and plans.

Receptor E2: Minsmere-Walberswick Heaths & Marshes SAC/Minsmere-Walberswick SPA & Ramsar site

NOx

5.4.10 The total (in combination) PC is forecast to be considerably more than 1% of the critical level for annual Nox and more than 10% of the critical level for short-term (24hr) Nox, being 14.5% and 31.1% of the critical level respectively. However, the critical level itself is not forecast to exceeded by the PEC for either annual or short-term Nox even when all sources of Nox are modelled 'in combination' (i.e. not just the generators for which a permit is being sought but including other sources such as road traffic and non-road mobile machinery). For annual Nox the PEC is forecast to be 37% of the critical level while for short-term Nox it is forecast to be 40.1% of the critical level.

5.4.11 Since the critical level will not be exceeded even 'in combination', potentially harmful levels of pollution will not be reached and no likely significant effect will arise from Nox in atmosphere, despite the fact that the 'in combination' PC will exceed 1% (or 10% for short-term Nox) of the critical level.

SO_2

5.4.12 The 'in combination' total PC will exceed 1% of the critical level being 1.8% of the critical level. However, the critical level for sulphur dioxide is not forecast to be exceeded by the PEC even when all sources of sulphur dioxide are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 21.6% of the critical level.

5.4.13 Since the critical level will not be exceeded, even 'in combination', potentially harmful levels of pollution will not be reached and no likely significant effect will arise from sulphur dioxide in atmosphere, despite the fact that the PC will exceed 1% of the critical level.

Ammonia

Special Area of Conservation

5.4.14 The nearest area of heathland within the SAC is 3km north of the SZC site. The majority of the heathland within the SAC lies more than 3.6km north of the SZC site. The nearest area of perennial vegetation of stony banks in the SAC is within 100m north of the SZC site.

5.4.15 According to isopleths, the 'in combination' PC at the closest area of heathland approximately 3km away will not exceed the 1% of the critical level threshold. The only part of the SAC which is forecast to be subject to an

'in combination' PC exceeding 1% of the critical level (0.01 μgm^{-3}) is the areas of perennial vegetation of stony banks located c. 100m north of the SZC site.

5.4.16 Therefore likely significant effects on SAC heathland can be dismissed, but likely significant effects on perennial vegetation of stony banks cannot be dismissed and require appropriate assessment.

Special Protection Area/Ramsar

5.4.17 A critical level of 3 μgm^{-3} is appropriate for the relevant SPA/Ramsar habitats because lichens and bryophytes are not relevant to the qualifying features of the SPA/Ramsar, and while heathland (which supports nightjar) can have such a flora its presence or diversity will not affect the ability of the habitat to support these bird species. The 3 μgm^{-3} critical level is not forecast to be exceeded by the PEC even when all sources of ammonia are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 1.34 μgm^{-3} or 44.7% of the higher critical level. This is despite the fact the 'in combination' PC at the closest area of marsh is 0.05 μgm^{-3} and thus will slightly exceed the 1% of the critical level threshold for this habitat.

5.4.18 Since the critical level will not be exceeded even 'in combination', potentially harmful levels of pollution will not be reached and no likely significant effect will arise on the SPA/Ramsar despite the fact the PC will exceed 1% of the critical level.

Nitrogen

Special Area of Conservation

5.4.19 The nearest area of heathland within the SAC is 3km north of the SZC site. The majority of the heathland within the SAC lies more than 3.6km north of the SZC site, well beyond the zone that isopleths indicate the 'in combination' PC would exceed 1% of the critical load (0.05 kgN/ha/yr). However, the nearest area of perennial vegetation of stony banks in the SAC is within 100m north of the SZC site. The PC from the generators alone at the closest area of perennial vegetation of stony banks is approximately 0.5 kgN/ha/yr or 10% of the critical load (5 kgN/ha/yr). Moreover, the PEC will exceed 5 kgN/ha/yr (i.e. 100% of the critical load) being 13.06 kgN/ha/yr.

5.4.20 Therefore, likely significant effects on perennial vegetation of stony banks in the SAC, cannot be dismissed.

Special Protection Area/Ramsar

5.4.21 Most of the SPA/Ramsar is designated for birds that use fen, marsh and swamp, which has a relatively high critical load of 15 kgN/ha/yr. This will not be exceeded by the PEC even when all sources of nitrogen are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 13.06 kgN/ha/yr or 87% of the critical load. Therefore, although the 'in combination' PC is 0.69 kgN/ha/yr and thus well above the 1% of the critical load threshold, no likely significant effect will arise on these habitats or the species they support.

5.4.22 Heathland (which supports nightjar) has a lower critical load of 5 kgN/ha/yr. The PEC will exceed 5 kgN/ha/yr (i.e. 100% of the critical level) being 13.06 kgN/ha/yr at the closest part of the SPA/Ramsar. However, the main areas of nightjar habitat in the SPA/Ramsar are in the extensive northern heathlands of the SPA/Ramsar, which are a minimum of 3km from the SZC site and generally more distant. These are beyond the 1% of the critical load isopleth for the 'in combination' PC.

5.4.23 Therefore, no likely significant effect will arise on the fen, marsh and swamp or heathland areas on the SPA/Ramsar or the birds which rely upon them, as either potentially harmful levels of pollution will not be reached, or the 'in combination' PC will fall below 1% of the critical load.

Summary

5.4.24 No likely significant effect on the SPA or most SAC habitats will arise alone or in combination with other projects and plans through most pollutants, but likely significant effects of ammonia and nitrogen deposition on perennial vegetation of stony banks in the SAC cannot be screened out.

Receptor E3: Orfordness-Shingle Street SAC

NOx

5.4.25 The critical level is not forecast to be exceeded by the PEC for either annual or short-term Nox even when all sources of Nox are modelled 'in combination' (i.e. not just the generators). For annual Nox the PEC is forecast to be 21.2% of the critical level while for short-term Nox it is forecast to be 9.4% of the critical level. The total (in combination) PC is also forecast to be less than 1% of the critical level for annual Nox and less than 10% of the critical level (24hr Nox), being 0.1% and 1.0% of the critical level respectively.

5.4.26 Since the critical level will not be exceeded even 'in combination' and the 'in combination' PC will not exceed 1% (or 10% for short-term Nox) of the critical level, no likely significant effect will arise.

SO_2

5.4.27 The critical level for sulphur dioxide is not forecast to be exceeded by the PEC even when all sources of sulphur dioxide are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 11.9% of the critical level. Moreover, the 'in combination' total PC is well below 1% of the critical level being less than 0.1% of the critical level (i.e. so low it does not show in the model to 2 decimal places).

5.4.28 Since the critical level will not be exceeded even 'in combination' and the 'in combination' PC will not exceed 1% of the critical level, no likely significant effect will arise.

Ammonia

5.4.29 Using a critical level of 1 μgm^{-3} appropriate for coastal vegetated shingle/perennial vegetation of stony banks, the critical level is forecast to be exceeded by the PEC, with the PEC forecast to be 113.2% of the critical level. However, the 'in combination' total PC is well below 1% of the critical level being 0.1% of the critical level.

5.4.30 Since the PC will not exceed 1% of the critical level, potentially harmful levels of pollution will not be reached and no likely significant effect will arise even though the PEC exceeds 100% of the critical level.

Nitrogen

5.4.31 Using a critical load of 5 kgN/ha/yr appropriate for coastal vegetated shingle, the critical load is forecast to be exceeded by the PEC, with the PEC forecast to be 227% of the critical load. However, the 'in combination' total PC is well below 1% of the critical load being 0.5% of the critical load.

5.4.32 Since the PC will not exceed 1% of the critical load, no likely significant effect will arise even though the PEC exceeds 100% of the critical level.

Summary

5.4.33 No likely significant effect on the SAC habitats will arise alone or in combination with other projects and plans.

Receptor E4: Sandlings SPA

NOx

5.4.34 The total (in combination) PC is forecast to be slightly over 1% of the critical level for annual Nox but less than 10% of the critical level (24hr Nox), being 1.5% and 4.0% of the critical level respectively. However, the critical level is not forecast to be exceeded by the PEC for either annual or short-term Nox even when all sources of Nox are modelled 'in combination' (i.e. not just the generators). For annual Nox the PEC is forecast to be 24% of the critical level while for short-term Nox it is forecast to be 13.1% of the critical level.

5.4.35 Since the critical level will not be exceeded even 'in combination', potentially harmful levels of pollution will not be reached and no likely significant effect will arise from Nox in atmosphere, notwithstanding the fact the PC for Nox will slightly exceed 1% of the annual critical level.

SO_2

5.4.36 The critical level for sulphur dioxide is not forecast to be exceeded by the PEC even when all sources of sulphur dioxide are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 13.7% of the critical level. Moreover, the 'in combination' total PC is well below 1% of the critical level being 0.2% of the critical level.

5.4.37 Since the critical level will not be exceeded even 'in combination', potentially harmful levels of pollution will not be reached and the 'in combination' PC will not exceed 1% of the critical level, no likely significant effect will arise.

Ammonia

5.4.38 Since the ability of the SPA to support its population of nightjar and woodlark will not be affected by the diversity or abundance of its lower plant communities, the higher critical level of 3 μgm^{-3} is most appropriate. That critical level will not be exceeded (the PEC at the closest part of the SPA being 1.38 μgm^{-3}) and the 'in combination' PC will not exceed 1% of the critical level being 0.04 μgm^{-3} at the closest part of the SPA.

5.4.39 Since the critical level will not be exceeded no likely significant effects on the SPA will arise.

Nitrogen

5.4.40 The critical load for heathland (5 kgN/ha/yr) will be exceeded with the PEC being 12.66 kgN/ha/yr or 253.3% of the critical load at the closest part of the SPA. This northern part of the SPA is one of the main locations of heathland in the site. The in combination PC will be 4.9% of the critical load. Only a small part of the SPA would be subject to nitrogen deposition above 1% of the critical load due to generators alone, but this nonetheless amounts to 9ha of heathland.

5.4.41 Since the critical load will be exceeded and the 'in combination' PC would exceed 1% of the critical load, likely significant effects on the SPA cannot be dismissed.

Summary

5.4.42 No likely significant effect on the SPA will arise alone or in combination with other projects and plans through most pollutants, but likely significant effects of nitrogen deposition on the heathland in the SPA cannot be screened out.

5.5 Modelled outcome: Scenario 1A 2025

Receptor E1 – Alde-Ore Estuary SPA/Alde-Ore and Butley Estuaries SAC

Nox

5.5.1 The critical level is not forecast to be exceeded by the PEC for either annual or short-term Nox even when all sources of Nox are modelled 'in combination' (i.e. not just the generators). For annual Nox the PEC is forecast to be 22.1% of the critical level while for short-term Nox it is forecast to be 11.2% of the critical level. The total (in combination) PC is also forecast to be less than 1% of the critical level for annual Nox and less than 10% of the critical level (24hr Nox), being 0.4% and 2.5% of the critical level respectively.

5.5.2 Since the critical level will not be exceeded even 'in combination' and the 'in combination' PC will not exceed 1% (or 10% for short-term Nox) of the critical level, no likely significant effect will arise from Nox in atmosphere.

SO_2

5.5.3 The critical level for sulphur dioxide is not forecast to be exceeded by the PEC even when all sources of sulphur dioxide are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 11.1% of the critical level. Moreover, the 'in combination' total PC is well below 1% of the critical level being less than 0.1% of the critical level.

5.5.4 Since the critical level will not be exceeded even 'in combination' and the 'in combination' PC will not exceed 1% of the critical level, no likely significant effect will arise from sulphur dioxide in atmosphere.

Ammonia

5.5.5 Using a critical level of 3 μgm^{-3} appropriate for saltmarsh, the critical level is not forecast to be exceeded by the PEC even when all sources of ammonia are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 44.3% of the critical level (1.33 μgm^{-3}). Moreover, the 'in combination' total PC is well below 1% of the critical level being 0.2% of the critical level.

5.5.6 Since the critical level will not be exceeded even 'in combination' and the PC will not exceed 1% of the critical level for the most appropriate habitat, no likely significant effect will arise from ammonia in atmosphere.

Nitrogen

5.5.7 The critical load for saltmarsh (10 kgN/ha/yr) is forecast to be exceeded by the PEC when all sources of nitrogen are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 133.2% of the critical load. However, the 'in combination' total PC is well below 1% of the critical load being 0.2% of the critical load.

5.5.8 Since the 'in combination' PC will not exceed 1% of the critical load, no likely significant effect will arise notwithstanding that the critical load will be exceeded.

Summary

5.5.9 No likely significant effect on this SAC will arise alone or in combination with other projects and plans.

Receptor E2: Minsmere-Walberswick Heaths & Marshes SAC/Minsmere-Walberswick SPA & Ramsar site

Annual Nox

5.5.10 The total (in combination) PC is forecast to be more than 1% of the critical level for annual Nox, being 46.9% of the critical level. However, the critical level is not forecast to be exceeded by the PEC for annual Nox even when all sources of Nox are modelled 'in combination' (i.e. not just the generators).

5.5.11 Since the critical level will not be exceeded even 'in combination' potentially harmful levels of pollution will not be reached and no likely significant effect will arise, despite the fact that the PC will exceed 1% of the critical level.

Short-term Nox

5.5.12 The total (in combination) PC is forecast to be more than 10% of the critical level for annual Nox, being 31.1% of the critical level. However, the critical level is not forecast to be exceeded by the PEC for short-term Nox even when all sources of Nox are modelled 'in combination' (i.e. not just the generators).

5.5.13 Since the critical level will not be exceeded even 'in combination' potentially harmful levels of pollution will not be reached and no likely significant effect will arise, despite the fact that the PC will exceed 10% of the critical level.

SO_2

5.5.14 The 'in combination' total PC will exceed 1% of the critical level being 2.5% of the critical level. However, the critical level for sulphur dioxide is not forecast to be exceeded by the PEC even when all sources of sulphur dioxide are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 22.3% of the critical level.

5.5.15 Since the critical level will not be exceeded even 'in combination' potentially harmful levels of pollution will not be reached and no likely significant effect will arise, despite the fact that the 'in combination' PC will exceed 1% of the critical level.

Ammonia

Special Area of Conservation

5.5.16 The nearest area of heathland within the SAC is 3km north of the SZC site. The nearest area of perennial vegetation of stony banks in the SAC is within 100m north of the SZC site. According to isopleths the heathland would be subject to an 'in combination' ammonia PC well below 1% of the critical level. However, areas of perennial vegetation of stony banks in the southern part of the SSSI would be subject to a PC exceeding 1% of the critical level. Isopleths show that the PC for ammonia from the generators alone will exceed 0.07 μgm^{-3} (7% of the critical level for perennial vegetation of stony banks). When all sources are considered 'in combination' the 1% of the critical level threshold (0.01 μgm^{-3}) will be exceeded over 70ha or 6% of the SAC.

5.5.17 Therefore likely significant effects on SAC perennial vegetation of stony banks in the SAC cannot be dismissed.

Special Protection Area/Ramsar

5.5.18 A critical level of 3 μgm^{-3} is appropriate for the relevant SPA/Ramsar habitats because lichens and bryophytes are not relevant to the qualifying features of the SPA/Ramsar, and while heathland (which support nightjar) can have such a flora its presence or diversity will not affect the ability of the habitat to support these bird species. The 3 μgm^{-3} critical level is not forecast to be exceeded by the PEC even when all sources of ammonia are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 1.39 μgm^{-3} or 46% of the higher critical level. This is despite the fact the 'in combination' PC at the closest area of marsh due to the generators alone is 0.09 μgm^{-3} and thus will exceed the 1% of the critical level threshold for this habitat.

5.5.19 Since the critical level will not be exceeded even 'in combination', potentially harmful levels of pollution will not be reached and no likely significant effect will arise on the SPA/Ramsar despite the fact the PC will exceed 1% of the critical level.

Nitrogen

Special Area of Conservation

5.5.20 In the location of the nearest coastal vegetated shingle c. 100m away, isopleths show that the PC for nitrogen from the generators alone will exceed 1kgN/ha/yr (20% of the critical load). The 1% of the critical level threshold (0.05 kgN/ha/yr) will be exceeded over approximately 477ha or 38% of the SAC. This includes approximately 93ha of heathland in the SAC. This heathland will be subject to deposition due to the generators alone of 0.05 to 0.1 kgN/ha/yr (10-20% of the critical load).

5.5.21 Therefore, likely significant effects on SAC heathland, and on perennial vegetation of stony banks, cannot be dismissed.

Special Protection Area/Ramsar

5.5.22 Most of the SPA/Ramsar is designated for birds that use fen, marsh and swamp, which has a relatively high critical load of 15 kgN/ha/yr. This will not be exceeded by the PEC even when all sources of nitrogen are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 13.79 kgN/ha/yr or 92% of the critical load. Therefore, although the 'in combination' PC is 1.42 kgN/ha/yr and thus well above the 1% of the critical load threshold, no likely significant effect will arise on these habitats or the species they support.

5.5.23 However, heathland (which support nightjar) has a lower critical load of 5 kgN/ha/yr. The PEC will exceed 5 kgN/ha/yr (i.e. 100% of the critical load) being 13.79 kgN/ha/yr at the closest part of the SPA/Ramsar. The 1% of the critical load threshold (0.05 kgN/ha/yr) will be exceeded over approximately 477ha or 38% of the SPA. This includes approximately 93ha of heathland in the SPA. This heathland will be subject to deposition due to the generators alone of 0.05 to 0.1 kgN/ha/yr (10-20% of the critical load).

5.5.24 Therefore, no likely significant effect will arise on the fen, marsh and swamp areas of the SPA/Ramsar or the birds which rely upon them, as potentially harmful levels of pollution will not be reached. However, likely

significant effects on the areas of heathland that support nesting nightjar in the SPA/Ramsar cannot be dismissed.

Summary

5.5.25 No likely significant effect on most SAC or SPA/Ramsar habitats will arise alone or in combination with other projects and plans through most pollutants, but likely significant effects of ammonia and nitrogen deposition on perennial vegetation of stony banks and heathland in the SAC and nitrogen deposition effects on heathland in the SPA cannot be screened out.

Receptor E3: Orfordness-Shingle Street SAC

Nox

5.5.26 The critical level is not forecast to exceeded by the PEC for either annual or short-term Nox even when all sources of Nox are modelled 'in combination' (i.e. not just the generators). For annual Nox the PEC is forecast to be 21.4% of the critical level while for short-term Nox it is forecast to be 10.5% of the critical level. The total (in combination) PC is also forecast to be less than 1% of the critical level for annual Nox and less than 10% of the critical level (24hr Nox), being 0.3% and 2.1% of the critical level respectively.

5.5.27 Since the critical level will not be exceeded even 'in combination' and the PC will not exceed 1% (or 10% for short-term Nox) of the critical level, no likely significant effect will arise.

SO_2

5.5.28 The critical level for sulphur dioxide is not forecast to be exceeded by the PEC even when all sources of sulphur dioxide are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 11.9% of the critical level. Moreover, the 'in combination' total PC is well below 1% of the critical level being less than 0.1% of the critical level (i.e. so low it does not show in the model to 2 decimal places).

5.5.29 Since the critical level will not be exceeded even 'in combination' and the PC will not exceed 1% of the critical level, no likely significant effect will arise.

Ammonia

5.5.30 Using a critical level of 1 μgm^{-3} appropriate for coastal vegetated shingle, the critical level is forecast to be exceeded by the PEC, with the PEC forecast to be 113.2% of the critical level. However, the 'in combination' total PC is well below 1% of the critical level being 0.1% of the critical level.

5.5.31 Since the PC will not exceed 1% of the critical level, no likely significant effect will arise.

Nitrogen

5.5.32 Using a critical level of 5 kgN/ha/yr appropriate for coastal vegetated shingle, the critical load is forecast to be exceeded by the PEC, with the PEC forecast to be 226.9% of the critical load. However, the 'in combination' total PC is well below 1% of the critical load being 0.5% of the critical load.

5.5.33 Since the PC will not exceed 1% of the critical load, no likely significant effect will arise.

Summary

5.5.34 No likely significant effect on the SAC will arise alone or in combination with other projects and plans.

Receptor E4: Sandlings SPA

Nox

5.5.35 The critical level is not forecast to be exceeded by the PEC for either annual or short-term Nox even when all sources of Nox are modelled 'in combination' (i.e. not just the generators). For annual Nox the PEC is forecast to be 25.2% of the critical level while for short-term Nox it is forecast to be 17.2% of the critical level. The total (in

combination) PC is forecast to be over 1% of the critical level for annual Nox but below 10% of the critical level for 24hr Nox, being 2.6% and 8.2% of the critical level respectively.

5.5.36 Since the critical level will not be exceeded even 'in combination', potentially harmful levels of pollution will not be reached and no likely significant effect will arise, notwithstanding the fact the PC for Nox will slightly exceed 1% (or 10% for daily Nox) of the critical level.

SO_2

5.5.37 The critical level for sulphur dioxide is not forecast to be exceeded by the PEC even when all sources of sulphur dioxide are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 13.7% of the critical level. Moreover, the 'in combination' total PC is well below 1% of the critical level being 0.2% of the critical level.

5.5.38 Since the critical level will not be exceeded even 'in combination' and the PC will not exceed 1% of the critical level, no likely significant effect will arise.

Ammonia

5.5.39 Since the ability of the SPA to support its population of nightjar and woodlark will not be affected by the diversity or abundance of its lower plant communities, the higher critical level of 3 μgm^{-3} is most appropriate. That critical level will not be exceeded (the PEC at the closest part of the SPA being 1.38 μgm^{-3}) and the 'in combination' PC will not exceed 1% of the critical level being 0.03 μgm^{-3} at the closest part of the SPA.

5.5.40 Since the critical level will not be exceeded no likely significant effects will arise on the SPA.

Nitrogen

5.5.41 The critical load for acid grassland and heathland (5 kgN/ha/yr) will be exceeded with the PEC being 253.1% of the critical load at the closest part of the SPA. Moreover, the 'in combination' PC will be 4.7% of the critical load. This northern part of the SPA is one of the main locations of heathland and acid grassland in the site. Approximately 36ha of the site (1% of the SPA) would be subject to nitrogen deposition above 1% of the critical load due to the generators alone, much of which is heathland.

5.5.42 Since the critical load will be exceeded and the 'in combination' PC would exceed 1% of the critical load, likely significant effects on the SPA cannot be dismissed.

Summary

5.5.43 No likely significant effect on the SPA will arise alone or in combination with other projects and plans through most pollutants, but likely significant effects of nitrogen deposition on SPA heathlands cannot be screened out.

5.6 Modelled outcome: Scenario 2E

Receptor E1: Alde-Ore Estuary SPA/Alde-Ore and Butley Estuaries SAC

Nox

5.6.1 The critical level is not forecast to be exceeded by the PEC for either annual or short-term Nox even when all sources of Nox are modelled 'in combination' (i.e. not just the generators). For annual Nox the PEC is forecast to be 21.9% of the critical level while for short-term Nox it is forecast to be 10.3% of the critical level. The total (in combination) PC is also forecast to be less than 1% of the critical level for annual Nox and less than 10% of the critical level (24hr Nox), being 0.2% and 1.6% of the critical level respectively.

5.6.2 Since the critical level will not be exceeded even 'in combination' and the 'in combination' PC will not exceed 1% (or 10% for short-term Nox) of the critical level, no likely significant effect will arise.

SO_2

5.6.3 The critical level for sulphur dioxide is not forecast to be exceeded by the PEC even when all sources of sulphur dioxide are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 10.9% of the

critical level. Moreover, the 'in combination' total PC is well below 1% of the critical level being 0.1% of the critical level.

5.6.4 Since the critical level will not be exceeded even 'in combination' and the 'in combination' PC will not exceed 1% of the critical level, no likely significant effect will arise.

Ammonia

5.6.5 Using a critical level of 3 μgm^{-3} appropriate for saltmarsh, the critical level is not forecast to be exceeded by the PEC even when all sources of ammonia are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 1.37 μgm^{-3} or 45.7% of the critical level. Moreover, the 'in combination' total PC is well below 1% of the critical level being so small as not to show at 2 decimal places.

5.6.6 Since the critical level will not be exceeded even 'in combination' and the 'in combination' PC will not exceed 1% of the critical level, no likely significant effect will arise.

Nitrogen

5.6.7 The critical load for saltmarsh (10 kgN/ha/yr) is forecast to be exceeded by the PEC when all sources of nitrogen are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 133.2% of the critical load. However, the 'in combination' total PC is well below 1% of the critical load being 0.2% of the critical load.

5.6.8 Since the 'in combination' PC will not exceed 1% of the critical load, no likely significant effect will arise notwithstanding that the critical load will be exceeded.

Summary

5.6.9 No likely significant effect on the SAC will arise alone or in combination with other projects and plans.

Receptor E2: Minsmere-Walberswick Heaths & Marshes SAC/Minsmere-Walberswick SPA & Ramsar site

Nox

5.6.10 The total (in combination) PC is forecast to be more than 1% of the critical level for annual Nox, and 10% of the critical level for short-term (24hr) Nox, being 21.3% and 30.9% of the critical level respectively. However, the critical level is not forecast to exceeded by the PEC for either annual Nox or short-term (24hr) Nox even when all sources of Nox are modelled 'in combination' (i.e. not just the generators), being 43.8% and 39.9% of the critical level respectively.

5.6.11 Since the critical level will not be exceeded even 'in combination' potentially harmful levels of pollution will not be reached and no likely significant effect will arise, despite the fact that the 'in combination' PC will exceed 1% of the critical level.

SO_2

5.6.12 The 'in combination' total PC will exceed 1% of the critical level being 11.5% of the critical level. However, the critical level for sulphur dioxide is not forecast to be exceeded by the PEC even when all sources of sulphur dioxide are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 31.3% of the critical level.

5.6.13 Since the critical level will not be exceeded even 'in combination' potentially harmful levels of pollution will not be reached and no likely significant effect will arise, despite the fact that the PC will exceed 1% of the critical level.

Ammonia

Special Area of Conservation

5.6.14 The nearest area of heathland within the SAC is 3km north of the SZC site. The nearest area of perennial vegetation of stony banks in the SAC is within 100m north of the SZC site. According to isopleths, the heathland would be subject to an 'in combination' ammonia PC of approximately 0.01 to 0.02 μgm^{-3} (i.e. 1-2% of the critical level). Most of this in combination PC is due to the generators alone. Isopleths show that at the nearest location of perennial vegetation of stony banks c. 100m north of the SZC site the PC due to the generators alone would be c. 0.25 μgm^{-3} (25% of the critical level). When all sources are considered in combination the 1% of the critical level threshold will be exceeded over 410ha (33%) of the SAC, including areas of heathland and perennial vegetation of stony banks.

5.6.15 Therefore, likely significant effects on SAC heathland, and on perennial vegetation of stony banks, cannot be dismissed.

Special Protection Area/Ramsar

5.6.16 A critical level of 3 μgm^{-3} is appropriate for the relevant SPA/Ramsar habitats because lichens and bryophytes are not relevant to the qualifying features of the SPA/Ramsar, and while heathland (which support nightjar) can have such a flora its presence or diversity will not affect the ability of the habitat to support these bird species. The 3 μgm^{-3} critical level is not forecast to be exceeded by the PEC even when all sources of ammonia are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 1.57 μgm^{-3} or 52% of the higher critical level. This is despite the fact the 'in combination' PC at the closest area of marsh due to the generators alone is 0.23 μgm^{-3} and thus will exceed the 1% of the critical level threshold for this habitat.

5.6.17 Since the critical level will not be exceeded even 'in combination', potentially harmful levels of pollution will not be reached and no likely significant effect will arise on the SPA/Ramsar despite the fact the PC will exceed 1% of the critical level.

Nitrogen

Special Area of Conservation

5.6.18 The nearest area of heathland within the SAC is 3km north of the SZC site. The majority of heathland in the SAC lies more than 3.6km from the SZC site. The nearest area of perennial vegetation of stony banks in the SAC is within 100m north of the SZC site. According to isopleths, the heathland would be subject to an 'in combination' nitrogen PC of approximately 0.1 to 0.05 kgN/ha/yr (i.e. 1-2% of the critical load). Most of this in combination PC is due to the generators alone. Isopleths show that at the nearest location of perennial vegetation of stony banks c. 100m north of the SZC site the PC due to the generators alone would exceed 1 kgN/ha/yr (20% of the critical load). When all sources are considered in combination the 1% of the critical level threshold will be exceeded over 645 ha (51.4%) of the SAC, including areas of heathland and perennial vegetation of stony banks.

5.6.19 Therefore, likely significant effects on SAC heathland, and on perennial vegetation of stony banks, cannot be dismissed.

Special Protection Area

5.6.20 Most of the SPA/Ramsar is designated for birds that use fen, marsh and swamp, which has a relatively high critical load of 15 kgN/ha/yr. This will be exceeded by the PEC when all sources of nitrogen are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 15.09 kgN/ha/yr or 100% of the critical load. Moreover, the 'in combination' PC is 2.72 kgN/ha/yr and thus well above the 1% of the critical load threshold.

5.6.21 Heathland (which support nightjar) has a lower critical load of 5 kgN/ha/yr. The PEC will exceed 5 kgN/ha/yr (i.e. 100% of the critical load) being 12.28 kgN/ha/yr at the closest part of the SPA/Ramsar. The 1% of the critical load threshold (0.05 kgN/ha/yr) will be exceeded over approximately 645 ha (51.4%) of the SPA,

including approximately 170 ha of heathland. This heathland will be subject to deposition from the generators alone of 0.1 to 0.05 kgN/ha/yr (i.e. 1-2% of the critical load).

5.6.22 Therefore likely significant effects on the fen, marsh and swamp areas on the SPA, or the birds which rely upon them, or on the areas of heathland that support nesting nightjar in the SPA/Ramsar cannot be dismissed.

Summary

5.6.23 No likely significant effect on most SAC or SPA/Ramsar habitats will arise alone or in combination with other projects and plans through most pollutants, but likely significant effects of ammonia and nitrogen deposition on perennial vegetation of stony banks and heathland in the SAC and nitrogen deposition effects on heathland and fen, marsh and swamp in the SPA cannot be screened out.

Receptor E3: Orfordness-Shingle Street SAC

Nox

5.6.24 The critical level is not forecast to exceeded by the PEC for either annual or short-term Nox even when all sources of Nox are modelled 'in combination' (i.e. not just the generators). For annual Nox the PEC is forecast to be 21.3% of the critical level while for short-term Nox it is forecast to be 9.4% of the critical level. The total (in combination) PC is also forecast to be less than 1% of the critical level for annual Nox and less than 10% of the critical level (24hr Nox), being 0.2% and 0.9% of the critical level respectively.

5.6.25 Since the critical level will not be exceeded even 'in combination' and the PC will not exceed 1% (or 10% for short-term Nox) of the critical level, no likely significant effect will arise.

SO_2

5.6.26 The critical level for sulphur dioxide is not forecast to be exceeded by the PEC even when all sources of sulphur dioxide are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 12% of the critical level. Moreover, the 'in combination' total PC is well below 1% of the critical level being 0.1% of the critical level.

5.6.27 Since the critical level will not be exceeded even 'in combination' and the PC will not exceed 1% of the critical level, no likely significant effect will arise.

Ammonia

5.6.28 Using a critical level of 1 μgm^{-3} appropriate for coastal vegetated shingle, the critical level is forecast to be exceeded by the PEC, with the PEC forecast to be 113.3% of the critical level. However, the 'in combination' total PC is well below 1% of the critical level being 0.2% of the critical level.

5.6.29 Since the PC will not exceed 1% of the critical level, no likely significant effect will arise.

Nitrogen

5.6.30 Using a critical level of 5 kgN/ha/yr appropriate for coastal vegetated shingle, the critical load is forecast to be exceeded by the PEC, with the PEC forecast to be 226.8% of the critical load. However, the 'in combination' total PC is well below 1% of the critical load being 0.3% of the critical load.

5.6.31 Since the PC will not exceed 1% of the critical load, no likely significant effect will arise.

Summary

5.6.32 No likely significant effect on this SAC will arise alone or in combination with other projects and plans.

Receptor E4: Sandlings SPA

Nox

5.6.33 The critical level is not forecast to be exceeded by the PEC for either annual or short-term Nox even when all sources of Nox are modelled 'in combination' (i.e. not just the generators). For annual Nox the PEC is forecast to be 24.0% of the critical level while for short-term Nox it is forecast to be 12.3% of the critical level. The total (in combination) PC is forecast to be slightly over 1% of the critical level for annual Nox but below 10% of the critical level for 24hr Nox, being 1.3% and 3.2% of the critical level respectively.

5.6.34 Since the critical level will not be exceeded even 'in combination', potentially harmful levels of pollution will not be reached and no likely significant effect will arise, notwithstanding the fact the PC for Nox will slightly exceed 1% of the critical level.

SO_2

5.6.35 The critical level for sulphur dioxide is not forecast to be exceeded by the PEC even when all sources of sulphur dioxide are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 14.2% of the critical level. The 'in combination' total PC is 0.13µgm^{-3} and thus below 1% of the critical level.

5.6.36 Since the critical level will not be exceeded even 'in combination' and the PC will not exceed 1% of the critical level potentially harmful levels of pollution will not be reached and no likely significant effect will arise.

Ammonia

5.6.37 Since the ability of the SPA to support its population of nightjar and woodlark will not be affected by the diversity or abundance of its lower plant communities, the higher critical level of 3 µgm^{-3} is most appropriate. That critical level will not be exceeded (the PEC at the closest part of the SPA being 1.36 µgm^{-3}) and the 'in combination' PC will not exceed 1% of the critical level being 0.02 µgm^{-3} at the closest part of the SPA.

5.6.38 Since the critical level will not be exceeded no likely significant effects on the SPA will arise.

Nitrogen

5.6.39 The critical load for heathland (5 kgN/ha/yr) will be exceeded with the PEC being 250.9% of the critical load. Moreover, the 'in combination' PC will be 2.5% of the critical load, of which approximately a third would be due to generators with the remaining contribution being from construction traffic. This northern part of the SPA is one of the main locations of heathland in the site. Approximately 65ha (1.9%) of the SPA will be subject to nitrogen deposition above 1% of the critical load due to the generators alone, and most of this habitat is heathland.

5.6.40 Since the critical load will be exceeded and the 'in combination' PC would exceed 1% of the critical load, likely significant effects on the SPA cannot be dismissed.

Summary

5.6.41 No likely significant effect on the SPA/Ramsar habitats will arise alone or in combination with other projects and plans through most pollutants, but likely significant effects of nitrogen deposition on SPA heathland cannot be screened out.

6 INFORMATION TO INFORM APPROPRIATE ASSESSMENT

6.1 Noise impacts

6.1.1 Likely Significant Effects as a result of disturbance due to noise impacts haven been identified on the qualifying bird interest features of the Minsmere-Walberswick SPA and Ramsar. The SoS HRA recognised that the noise sensitivity thresholds above which a potentially adverse behavioural response may be observed for foraging marsh harrier and non-breeding waterbirds (70dB Lamax) and breeding waterbirds (65dB Lamax) were suitably precautionary. These sensitivity thresholds are based on sudden impulsive, or impact sounds, such as hammering, as opposed to continuous (largely non-impulsive) noise. This is because impulsive noises are considered more likely to lead to behavioural responses by birds.

6.1.2 The use of the generator for (up to) three years could result in temporary noise impacts above the 65dB level described above. However, there is no impulsive-type noise generated (on which the disturbance thresholds that informed the SoS HRA are based) and, therefore, noise levels during the operation of the generator are expected to be well below the level at which disturbing effects could occur. Disturbance effects may therefore occur only within very close proximity (tens of metres) of the source.

6.1.3 As the reedbeds within the Minsmere-Walberswick SPA and Ramsar that are used for breeding by Marsh Harrier are located >500m the location of the generator, there is no potential for effects on breeding birds within the SPA/Ramsar due to the separation distance. Furthermore, there is no potential for noise levels that could result in disturbance encroaching on the SPA or Ramsar site, or the Minsmere Levels or Sizewell Marshes, which may be functionally linked. There is a possibility that foraging Marsh Harrier, Gadwall or Shoveler may be present and foraging within the (tens of metres) zone of influence identified in 6.1.2; however, the spatial zone of potential disturbance effects from the generator alone is considered insignificant in the context of the wider areas of habitat used by these species. It is therefore considered that the effects of disturbance alone would not result in adverse effects on integrity, having no consequence on the ability of the SPA/Ramsar sites to achieve their conservation objectives to maintain or restore the population and distribution of qualifying interest features within the site.

6.1.4 In-combination with the wider Sizewell C Project, it is possible that there could be adverse disturbance effects on the breeding marsh harrier feature of the SPA and Ramsar site due to a barrier effect affecting foraging activity of this species: the SoS HRA concluded that adverse effects on the integrity of the SPA and Ramsar could not be excluded, beyond reasonable scientific doubt. The SoS HRA concluded that there was a case for derogation, and compensatory measures have been implemented.

6.1.5 The operation of the generators is expected to take place at the same time as elements of the Phase 1 construction works for the Sizewell C Project. If it is assumed that the Phase 1 construction works create a noise and disturbance barrier (as assessed in the SoS HRA), the effect of all proposed works under this permit, would

be within the noise disturbance zone for the Sizewell C Project. The proposed Works would not, therefore, add to or alter the disturbance effect of the Sizewell C Project.

6.1.6 Adverse effects on integrity alone and in-combination on the Minsmere-Walberswick SPA and Ramsar can therefore be excluded, beyond reasonable scientific doubt.

6.2 Air Quality impacts

6.2.1 The air quality modelling reported in this document has taken account of other 'in combination' or cumulative sources of atmospheric pollutants that will be emitted at the same time as the works for which a permit is being sought.

6.2.2 It was possible to rule out likely significant effects alone or in combination on Alde-Ore Estuary SPA/Alde-Ore and Butley Estuaries SAC, and on Orfordness-Shingle Street SAC.

6.2.3 It has not been possible to rule out likely significant effects on Minsmere-Walberswick Heaths and Marshes SAC, Minsmere-Walberswick SPA/Ramsar site or Sandlings SPA. As such it is necessary to undertake further assessment to determine whether adverse effects on the integrity of European sites can be ruled out alone and in-combination, considering mitigation measures.

6.2.4 As set out in section 5 the following likely significant effects cannot be dismissed:

Scenario 1A 2024

- Minsmere to Walberswick Heaths and Marshes SAC – Nitrogen deposition and ammonia PC above 1% of the critical load/level on some areas of perennial vegetation of stony banks. Approximately 24ha (1.9%) of the SAC (for ammonia) and 67ha (5.3%) of the SAC (for nitrogen deposition) will be subject to a PC above 1% of the critical level or load due to the generators alone, with the maximum PC being 1% of the critical level for ammonia and 10% of the critical load for nitrogen at the closest area of perennial vegetation of stony banks immediately north of the SZC site.
- Sandlings SPA – Nitrogen deposition PC above 1% of the critical load/level on areas of heathland of importance for nightjar and woodlark. Approximately 9ha of heathland would be subject to nitrogen deposition exceeding 1% of the critical load due to the generators alone.

Scenario 1A 2025

- Minsmere to Walberswick Heaths and Marshes SAC – Nitrogen deposition and ammonia PC above 1% of the critical load/level on some areas of perennial vegetation of stony banks and (for nitrogen deposition) heathland. Approximately 6% of the SAC/SPA (for ammonia) and 38% of the SAC/SPA (for nitrogen deposition) will be subject to an 'in combination' PC above 1% of the critical level or load, with the maximum PC from the generators alone being 7% of the critical level for ammonia and 20% of the critical load for nitrogen at the closest area of perennial vegetation of stony banks immediately north of the SZC site.
- Sandlings SPA – Nitrogen deposition PC above 1% of the critical load/level on areas of heathland of importance for nightjar and woodlark. Approximately 36ha of heathland would be subject to nitrogen deposition exceeding 1% of the critical load due to the generators alone.

Scenario 2E

- Minsmere to Walberswick Heaths and Marshes SAC and Minsmere-Walberswick SPA/Ramsar – Nitrogen deposition and ammonia PC above 1% of the critical load/level on some areas of marsh, heathland and, particularly, vegetated shingle. Approximately 33% of the SAC (for ammonia) and 51.4% of the SAC/SPA (for nitrogen deposition) will be subject to an 'in combination' PC above 1% of the critical level or load, with the maximum PC from the generators alone being 25% of the critical level for ammonia and 20% of the critical load for nitrogen at the closest area of perennial vegetation of stony banks immediately north of the SZC site. At areas of heathland the impact is much smaller (1-2% of the critical load).

- Sandlings SPA – Nitrogen deposition PC above 1% of the critical load on areas of heathland of importance to nightjar and woodlark. Approximately 65ha (1.9%) of the SPA would be subject to nitrogen deposition exceeding 1% of the critical load due to the generators alone.

6.3 Conservation objectives

6.3.1 Minsmere to Walberswick Heaths and Marshes SAC and Minsmere-Walberswick SPA have an air quality objective in the Supplementary Advice on the Conservation Objectives (SACO) to '*Restore as necessary the concentrations and deposition of air pollutants to below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System'*. This applies to the heathland of the SAC and the habitats which supports the populations of nightjar and other SPA species. For the perennial vegetation of stony banks feature there is a target to '*Maintain the low nutrient status of the sediment and soils that support the specialised vegetation communities'.* The SACO also contains the following targets related to habitat structure of the heathland and perennial vegetation of stony banks:

- *'Restore the total extent of the annual (H1210) and perennial (H1220) vegetated shingle features to 59 hectares';*
- *'Restore the distribution and continuity of the (perennial vegetation of stony banks) habitat and its natural transitions within the site that enable the full succession from older to younger ridges to be represented.*
- *'Restore a cover of dense bracken to a low level typically of less than <10%', 'Restore cover of common gorse Ulex europaeus at <25% and the combined cover of U. europaeus and U. gallii at <50%',*
- *'Restore the mix of vegetation (optimal conditions normally with vegetation mostly of 20-60 cm with frequent bare patches of >2 m2, 10-20% bare ground and <50% tree/scrub cover overall; trees <2 m in height) throughout the nesting area',*
- *'Restore management or other measures(whether within and/or outside the site boundary as appropriate) necessary to restore the structure, function and/or the supporting processes associated with breeding Nightjar and its supporting habitats' and*
- *'Maintain the ability of the feature's supporting habitats to adapt or evolve to wider environmental change, either within or external to the site'.*

6.3.2 Additional ammonia and nitrogen from the generators, in combination with other nitrogen sources, could impede achievement of the air quality conservation target directly and the habitat structure targets indirectly.

6.3.3 Sandlings SPA has an air quality objective in the s to 'Restore as necessary the concentrations and deposition of air pollutants to below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System'. This applies to both nightjar and woodlark. Additional ammonia and nitrogen from the generators, in combination with other nitrogen sources, could impede achievement of that conservation target. The SACO also contains the following targets related to habitat structure:

- *'Restore the mix of vegetation (optimal conditions normally with vegetation mostly of 20-60 cm with frequent bare patches of >2 m^2, 10-20% bare ground and <50% tree/scrub cover overall; trees <2 m in height) throughout the nesting area',*
- '*Restore management or other measures(whether within and/or outside the site boundary as appropriate) necessary to restore the structure, function and/or the supporting processes associated with breeding Nightjar and its supporting habitats'* and
- '*Maintain the ability of the feature's supporting habitats to adapt or evolve to wider environmental change, either within or external to the site'.*

6.4 Evidence for Ecological Effects of Ammonia and Nitrogen

6.4.1 The remainder of this section focusses on discussion of ammonia and nitrogen deposition effects on heathland, vegetated shingle and sand dunes, these being the most sensitive habitats within the European sites. They can result in the following impacts (not an exhaustive list):

- These systems are adapted to low levels of mineral nitrogen availability: increasing the availability of nitrogen will threaten the competitive balance between species leading to changes in composition and loss of habitat species constants.
- Nitrogen deposition can speed up the succession through the chronosequence, advancing habitats between the dune stages.
- Lichens and mosses are particularly sensitive both from direct effects associated with ammonia and from shading as a consequence of increase growth of overstorey vegetation in response to nitrogen deposition.
- Disruption of the competitive balance between species leading to changes in composition and loss of habitat species constants.
- Increases in grass cover i.e. shift from heath with a high proportion of dwarf shrubs to acid grassland.
- Change in species composition due to eutrophication, and shading of the lower storey vegetation, mosses, lichens and forbs, by taller faster growing species e.g. graminoids and sometimes sedges.
- Increased pests and grazers as plant tissue becomes more palatable.
- Bleaching on sensitive species, usually occurs first on lichens.

6.4.2 There is little research on coastal vegetated shingle/perennial vegetation of stony banks but sand dunes can be used as a partial proxy. Bobbink et al (2022)[20] notes that for dune grasslands there is now strong evidence from a wide range of studies including in situ nitrogen additions, experimental mesocosms under a range of exposure methods, gradient studies and analysis of untargeted surveys. There is new evidence, from multiple sources, of ecological changes in both calcareous and acidic dunes at the lower end of this range. In many Dutch dry dune grasslands, tall grasses have increased since the 1970's, a period of increased nitrogen deposition, particularly from agricultural sources. Because of reduced light penetration through the tall grass canopies formed by these species, the development of several prostrate species has been reduced and management is now necessary to maintain the diversity of these systems. In the past, tall graminoids were usually not dominant on these low nutrient sandy dune soils in the Netherlands. The report notes that dunes in Britain generally receive less nitrogen deposition and this is correlated with a greater species richness and less dominance of tall grasses than in Dutch dunes.

6.4.3 A targeted survey in the coastal dune areas across England and Wales, in regions with much lower N deposition than in the Netherlands surveyed eleven coastal dune sites with atmospheric N deposition ranging from 10 to 30 kgN/ha/yr. In these stable dune grasslands, above-ground biomass was related positively to nitrogen deposition, while species richness showed a weak negative relationship. A separate UK study reported in the same research identified a reduction in the number of bryophyte species with increasing nitrogen deposition. The report notes that reduction in traditional grazing may also be a reason for reduced species richness and increased dominance of tall grasses.

[20] Bobbink R, Loran C, Tomassen H. 2022. Review and Revision of Empirical Critical Loads of Nitrogen for Europe. Report for the German Environment Agency

6.4.4 For lowland heathland Bobbink et al (2022) states that despite the conservation and management efforts in nature reserves, many lowland heaths in western Europe have become dominated by grass species. By using aerial photographs, it was demonstrated that more than 35% of Dutch heaths developed into grasslands during the 1980s. It was suggested that a strong increase in atmospheric nitrogen deposition contributed to this transition towards grassland. Competition experiments in containers and in the field have clearly demonstrated an important effect of increased N availability on the competitive interactions between *Calluna vulgaris* and grasses in the early phase of secondary succession in dry lowland heath. Understory species, especially the typical and frequently occurring lichen and moss species, can be negatively affected by increased growth of vascular species due to (for example) increased shading.

6.4.5 Similar patterns were found in the UK over the past 20 to 50 years. However, the authors do note that changes in management practices (a move away from grazing, burning and sod cutting) may also be partly responsible for this shift to grass heath. The authors note that the intensity of management of *Calluna* heathlands may affect the impact of increased nitrogen such that more intense management would make the heathlands more resilient to nitrogen deposition thus raising its critical load. They therefore advocate a critical load of 15 kgN/ha/yr for heathlands with high intensity management.

6.4.6 Changes in botanical species composition of groundflora are less relevant to breeding nightjar and woodlark. However, both species could be affected by coarse changes in nesting habitat structure if a progression from dwarf shrub heath with clearings for nesting progresses to acid grassland and leaves their nest sites more exposed to predators.

6.5 Assessment of this permit

6.5.1 The forecast change in ammonia concentrations and nitrogen deposition rates due to the generators alone is equivalent to 10-20% of the critical load for nitrogen deposition (0.5 to 1 kgN/ha/yr) at the closest perennial vegetation of stony banks in Minsmere-Walberswick Heaths & Marshes SAC, or equivalent to 2% of the critical load (0.1 kgN/ha/yr) at the closest heathland in Sandlings SPA. Based on the information in the previous section PCs of this magnitude could potentially cause detectable botanical effects **if this was a long-term or permanent nitrogen source**. Moreover, the physical extent of exposure is considerable, with nitrogen deposition from the generators affecting 5.3% to 51.4% of Minsmere to Walberswick Heaths & Marshes SAC/SPA and 9ha to 65ha of heathland within Sandlings SPA (depending on scenario).

6.5.2 **However,** this must be balanced against three important factors:

- Firstly, the impacts discussed in this HRA Report are temporary, lasting a total of approximately three years (c. 2024/25 – 2027/28). They therefore will not affect long-term nitrogen deposition or ammonia concentrations which are most relevant for affecting habitats and species.
- Secondly, as reported in the DCO sHRA, for nitrogen deposition there is evidence that at high background deposition rates such as are currently experienced at both European sites the degree of botanical change in most parameters from incremental further additions of nitrogen is much smaller than at low background deposition rates.
- Thirdly, the impacts of the generators for this temporary period must be considered within the context of the longer term (effectively permanent) changes in the landscape being delivered by the SZC project which is removing large areas of agricultural land (a major source of ammonia and nitrogen) from arable production.

These are discussed in turn below.

Duration of impact

6.5.3 Critical levels are an annual average but once the source of pollution ceases it no longer contributes to concentrations in atmosphere. The critical load system for nitrogen deposition assumes decades of continuous exposure[21]. Over the short term an elevation in nitrogen deposition is unlikely to result in changes in vegetation communities over the temporary period the generators are proposed to be operational (up to three years) taking into account the considerable variation in background nitrogen deposition that is likely to occur normally over short time periods. For example the UK APIS reports that background nitrogen deposition to short vegetation for the closest part of Minsmere to Walberswick Heaths and Marshes SAC and Minsmere-Walberswick SPA between 2005 and 2010 varied annually by as much as 0.7 kgN/ha/yr, while ammonia concentrations fluctuated annually by up to 0.1 μgm^{-3}, equivalent to 40-50% of the worst-case nitrogen (1.6 kgN.ha/yr) and ammonia (0.2 μgm^{-3}) PC forecast from the generators to this SAC/SPA.

6.5.4 Similarly, at the closest part of Sandlings SPA, APIS indicates nitrogen deposition to short vegetation between 2005 and 2010 fluctuated annually by up to 0.7 kgN/ha/yr, approximately seven times the worst-cast PC forecast from the generators (in Scenario 2E), while ammonia concentrations fluctuated by up to 0.1 μgm^{-3}, approximately ten times the worst-case PC from the generators to the closest part of this SPA (also Scenario 2E).

6.5.5 Caporn et al (2016)[24] specifically addresses this point in sections 2.2.1 and 5.1 stating that 'The current rate of N deposition is primarily a proxy for long-term cumulative N deposition. Thus we would not expect that a change in N deposition, either increasing or decreasing, would immediately change species richness or composition, but instead these would be gradually influenced by longer-term changes in N deposition'. Given this, and the fact that the fluctuations in background nitrogen deposition and ammonia concentrations are already considerable based on data from APIS, it is considered that the contributions of the generators would not materially influence long-term nitrogen deposition.

6.5.6 Since the generators for which a permit is being sought would not materially influence long-term nitrogen deposition they would not interfere with the achievement of the air quality 'restore' target discussed earlier for the SAC or either SPA.

Reduced effect of increases in nitrogen deposition at higher background deposition rates

6.5.7 At both Minsmere to Walberswick Heaths and Marshes SAC/Minsmere-Walberswick SPA/Ramsar and Sandlings SPA existing nitrogen deposition already far exceeds the minimum critical load for the most sensitive habitats. At the closest part of both European sites to the SZC site, APIS indicates current background nitrogen deposition rates to short vegetation at 12.4 kgN/ha/yr (almost 2.5 times the critical load for the most sensitive habitats).

6.5.8 This is relevant because Caporn et al (2016), Table 21 and Appendix 5 shows that for many parameters (particularly botanical species richness) the scale of change from adding a given dose of nitrogen is smaller when the existing deposition rates are higher. For example, at background deposition rates of 10-15 kgN/ha/yr, an increase in long-term nitrogen deposition of 1.3 kgN/ha/yr (26% of the critical load) would be required in lowland heathland to reduce species richness by 1 species (note that this does not mean that any species are totally lost from the sward but that the frequency of their occurrence would reduce). Data were not available for coastal vegetated shingle, but in sand dunes (as a proxy) an increase in long-term nitrogen deposition of 0.5 to 1.1 kgN/ha/yr would be required to reduce species richness by 1 species. At lower background deposition

[21] '*Typically, critical loads relate to the potential effects over periods of decades… critical loads provide the long-term deposition* [emphasis added] *below which we are sure that adverse ecosystem effects will not occur'*, source: page 220, World Health Organization. 2000. Air Quality Guidelines for Europe. WHO Regional Publications, European Series, No. 91. Second Edition

rates, around the critical load (5 kgN/ha/yr), the necessary additional nitrogen doses to reduce species richness by 1 species fall by 50% to 66%.

6.5.9 These increases in deposition rate are similar to those which are forecast as a reasonable worst case from the generators at the closest point of Minsmere to Walberswick Heaths and Marshes SAC/Minsmere-Walberswick SPA and Sandlings SPA. This illustrates that, while additional long-term nitrogen can have an effect whatever the background rates, that effect is much greater when the background rate is low, rather than when it is well above the critical load as in this case. At higher deposition rates the botanical effect, while measurable, is small. Moreover, the effects reported above assume that the new nitrogen source is effectively permanent (i.e. an annual input lasting decades). The report notes in Section 5.4.3 that '*it is very likely that any inferred reduction in species richness due to N is the product of many years of N deposition'.*

6.5.10 The limited effect of a specific incremental addition at increased background rates above the critical load is probably attributable to the fact that there is already ample nitrogen for more competitive plants to respond. Therefore, any botanical effect, while it might occur, is likely to be significantly less than it would be if background nitrogen deposition rates were lower.

Long-term changes in local environment

6.5.11 To facilitate construction of the SZC project, large areas of land are being removed from agricultural production either for the permanent footprint of the development, the temporary footprint of the development (which is relevant given the permit is being sought for a temporary source of emissions), or for mitigation areas. The Biodiversity Net Gain report for the project[22] identifies that approximately 145ha of arable land will be permanently removed from agricultural production to facilitate the main development, not including fields returned to arable land following construction which totals a further c. 38ha. A further c. 118ha of arable land is being removed from production to create the off-site mitigation areas (such as the marsh harrier habitat improvement area). The closest of these to Minsmere-Walberswick Heaths and Marshes SAC/Minsmere-Walberswick SPA/Ramsar is the marsh harrier compensation area which is 100m away, while Aldhurst Farm, which amounts to 67ha in area and is now called Wild Aldhurst, is located approximately 1km west of Minsmere-Walberswick Heaths and Marshes SAC/Minsmere-Walberswick SPA/Ramsar.

6.5.12 All of the areas that will be removed permanently have now been moved out of production and will not be reverted. The removal of this land from agricultural production will reduce ammonia emissions within the associated grid squares and reduce nitrogen deposition on the designated sites in the long-term, illustrating that the current modelling is precautionary as it takes no account of that change in land use.

6.5.13 It is therefore concluded that there would be no adverse effect on the integrity of any European sites as a result of the three years of forecast emissions and resulting nitrogen deposition from the generators alone, or in combination with other plans or projects.

[22] EN010012-003968-Sizewell C Project - Other- Deadline 1 submission - Appendix 14E Biodiversity Net Gain Report.pdf (planninginspectorate.gov.uk)

7 CONCLUSION

7.1.1 It was possible to rule out likely significant effects alone or in combination on Alde-Ore Estuary SPA/Alde-Ore and Butley Estuaries SAC, Outer Thames Estuary SPA, and on Orfordness-Shingle Street SAC.

7.1.2 It was not possible to rule out likely significant effects resulting from emissions from the generators alone (and thus also in combination) on the heathland and perennial vegetation of stony banks of Minsmere-Walberswick Heaths and Marshes SAC or the marsh and heathland which supports the nightjar and woodlark populations of either Minsmere-Walberswick SPA or Sandlings SPA, under at least some scenarios. It was also not possible to rule out likely significant effects as a result of disturbance from the generators alone on Minsmere-Walberswick SPA/Ramsar site.

7.1.3 An appropriate assessment was therefore undertaken which considered the potential for noise impacts to result in adverse effects on integrity due to disturbance (in light of the Minsmere-Walberswick SPA/Ramsar site conservation objectives). It was determined beyond reasonable scientific doubt that there would be no adverse effects on integrity, alone or in-combination as a result of disturbance.

7.1.4 The appropriate assessment also considered the ecological effects of ammonia and nitrogen deposition on heathlands and the birds that use such habitats. It was confirmed that no adverse effect on the integrity of these European sites would arise from the generators due to:

- Firstly, the impacts discussed in this HRA Report are temporary, lasting a total of approximately three years (c. 2024/25 – 2027/28). They therefore will not affect long-term nitrogen deposition or ammonia concentrations which are most relevant for affecting habitats and species.
- Secondly, as reported in the DCO sHRA[23], for nitrogen deposition there is evidence that at high background deposition rates such as are currently experienced at both European sites the degree of botanical change in most parameters from incremental further additions of nitrogen is much smaller than at low background deposition rates.
- Thirdly, the impacts of the generators for this temporary period must be considered within the context of the longer term (effectively permanent) changes in the landscape being delivered by the Sizewell C project which is removing large areas of agricultural land (a major source of ammonia and nitrogen) from arable production.

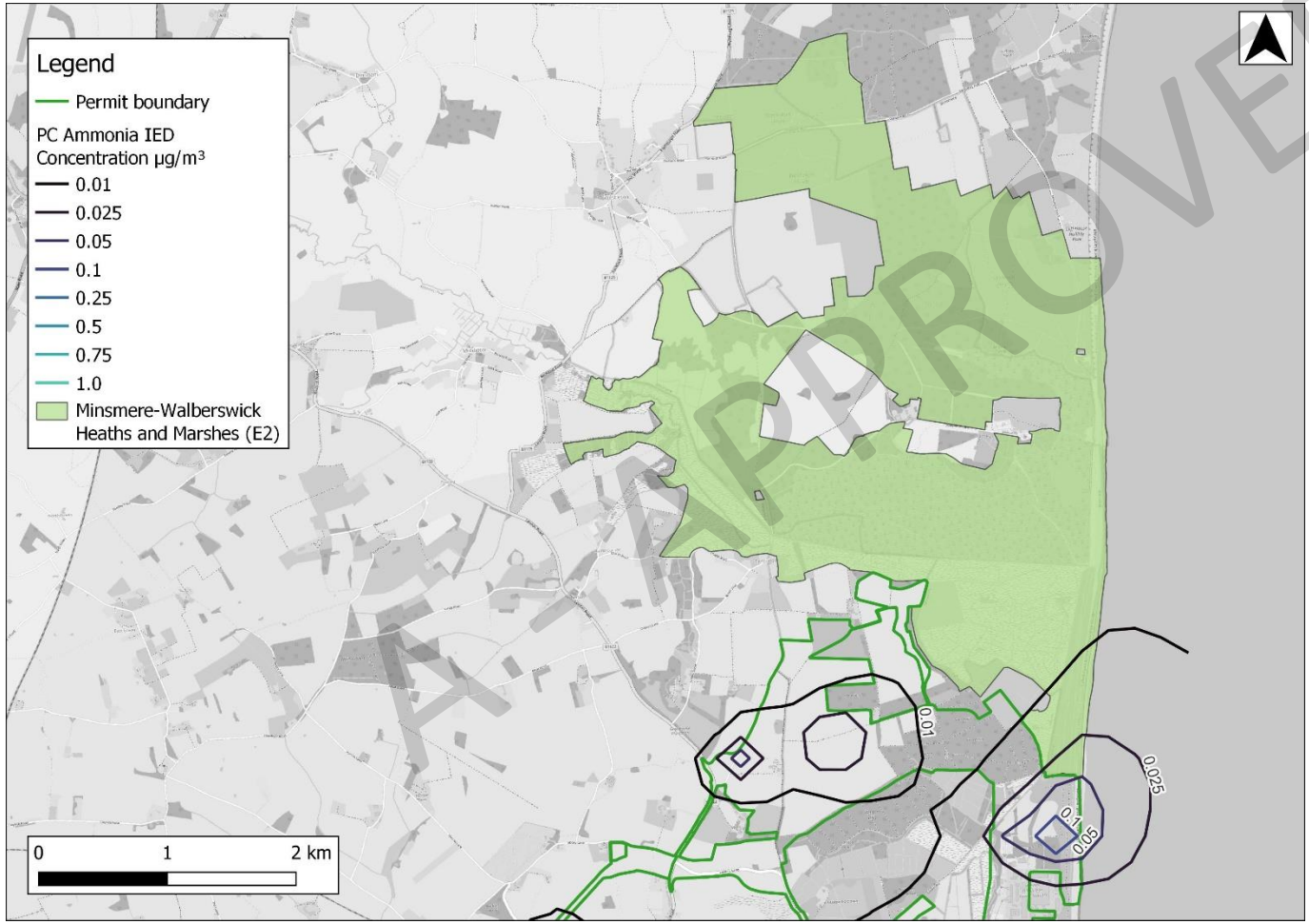
[23] Such as paragraph 7.7.27 in Volume 5.10 the Shadow Habitats Regulations Assessment Volume 1 (EN010012-001765-SZC_Bk5_5.10_V1_Shadow_HRA_Report_Part_1_of_5.pdf (planninginspectorate.gov.uk))

8 APPENDIX A

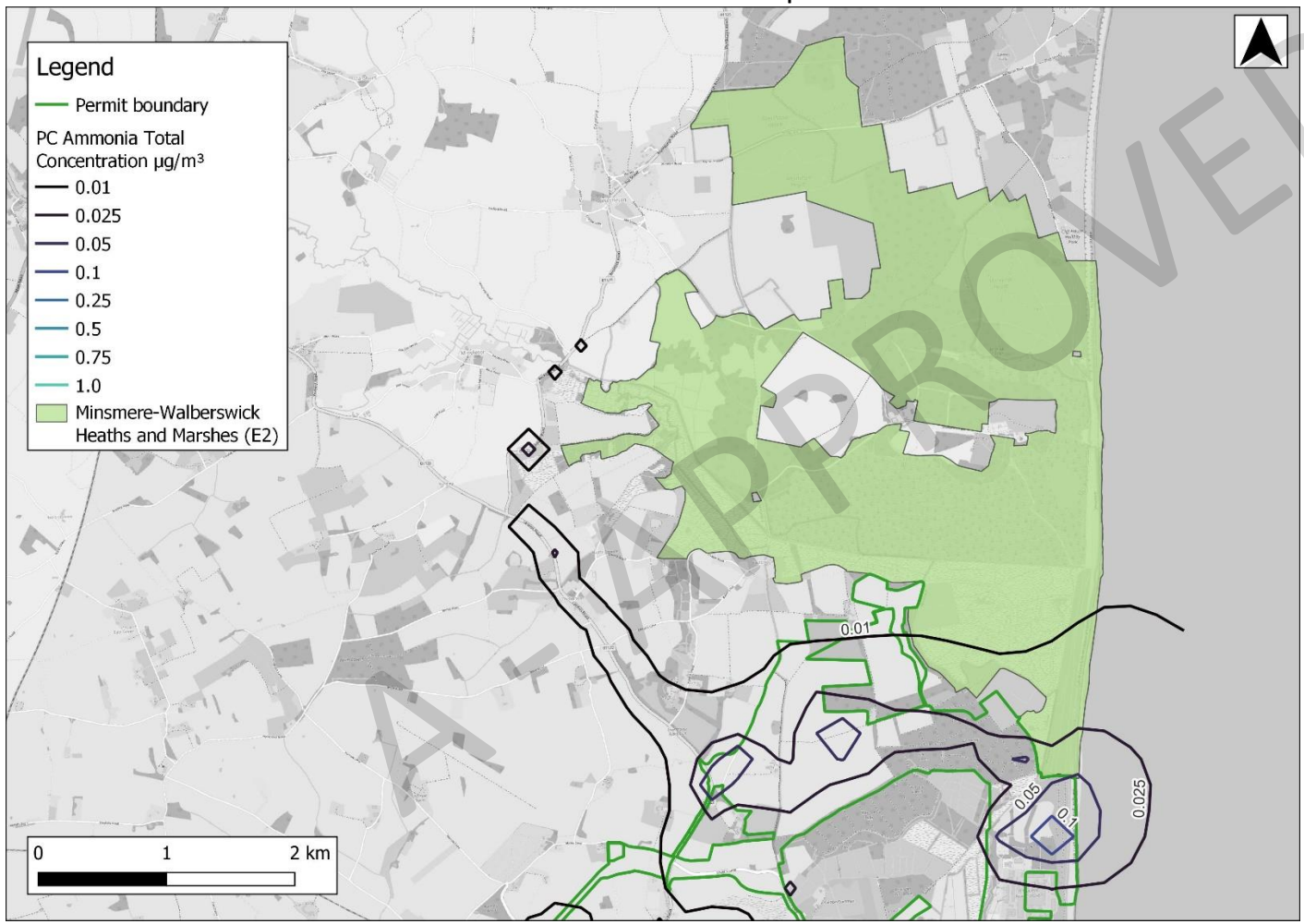
A.1 Isopleth maps referenced in the main text

A.1.1 Scenario 1A (EW 2024)

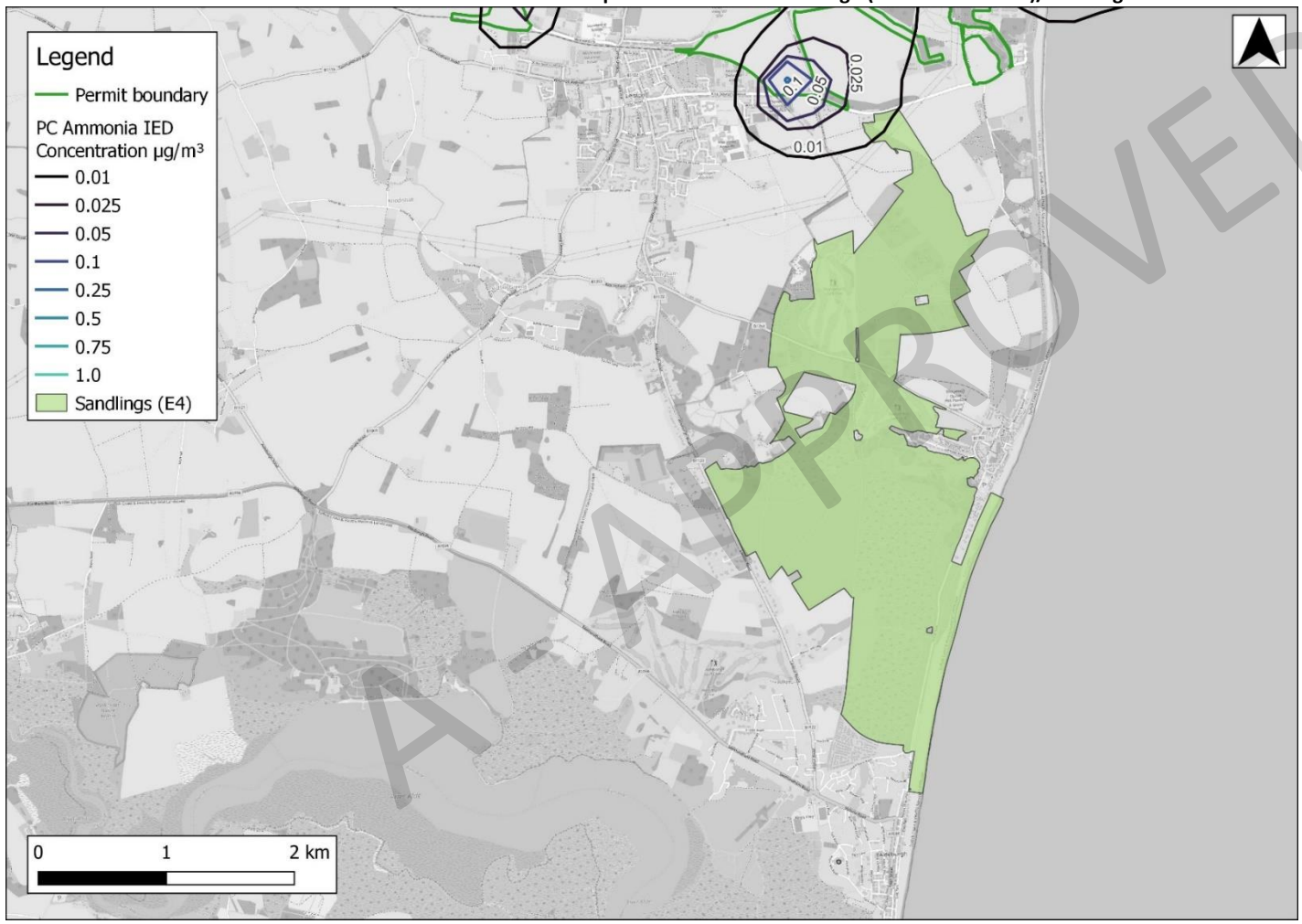
Ammonia 'alone' isopleths for Minsmere-Walberswick



Ammonia 'in combination' isolpleths for Minsmere-Walberswick

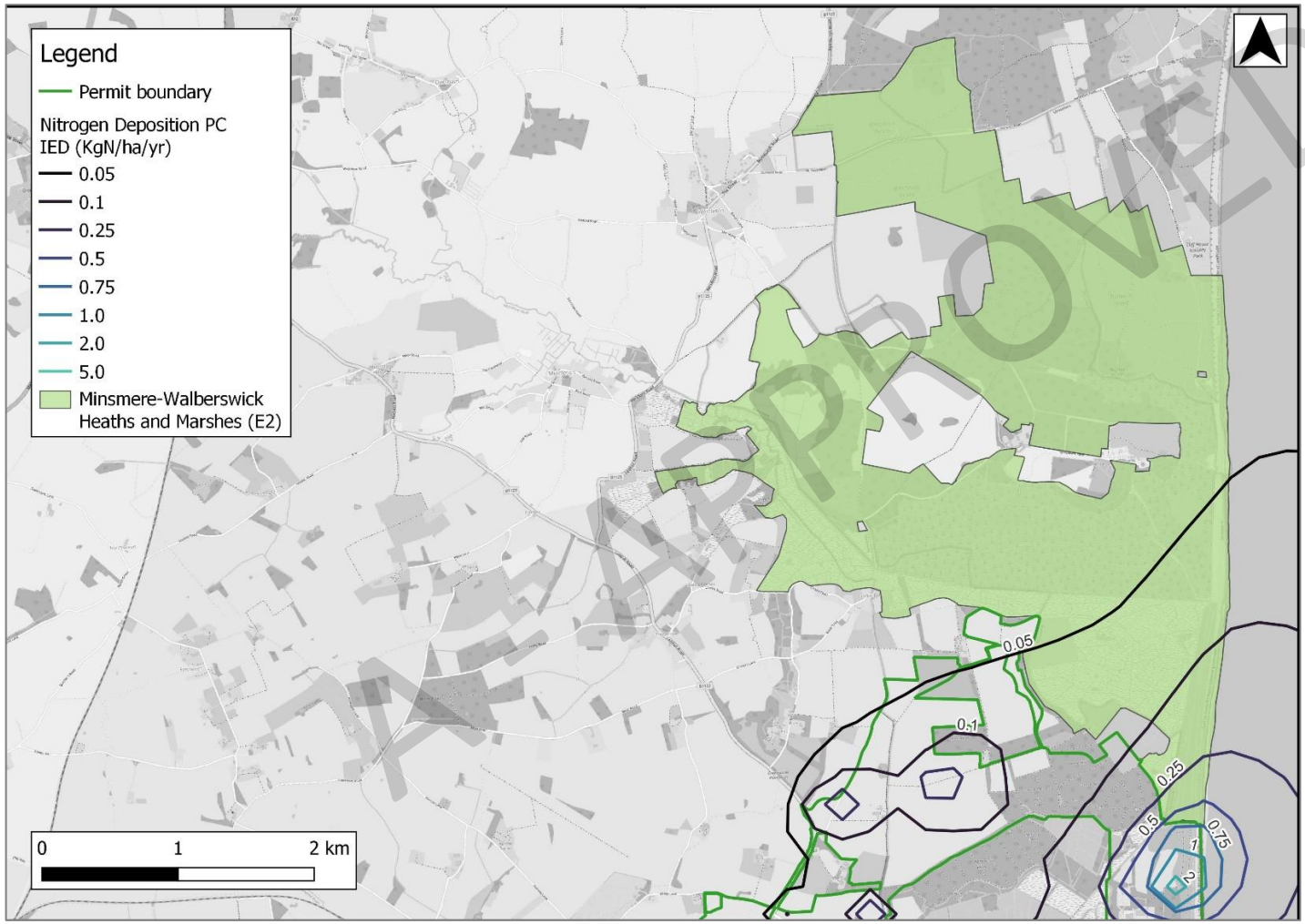


Ammonia 'alone' isopleths for Leiston-Aldeburgh (Northern Section)/Sandlings SPA

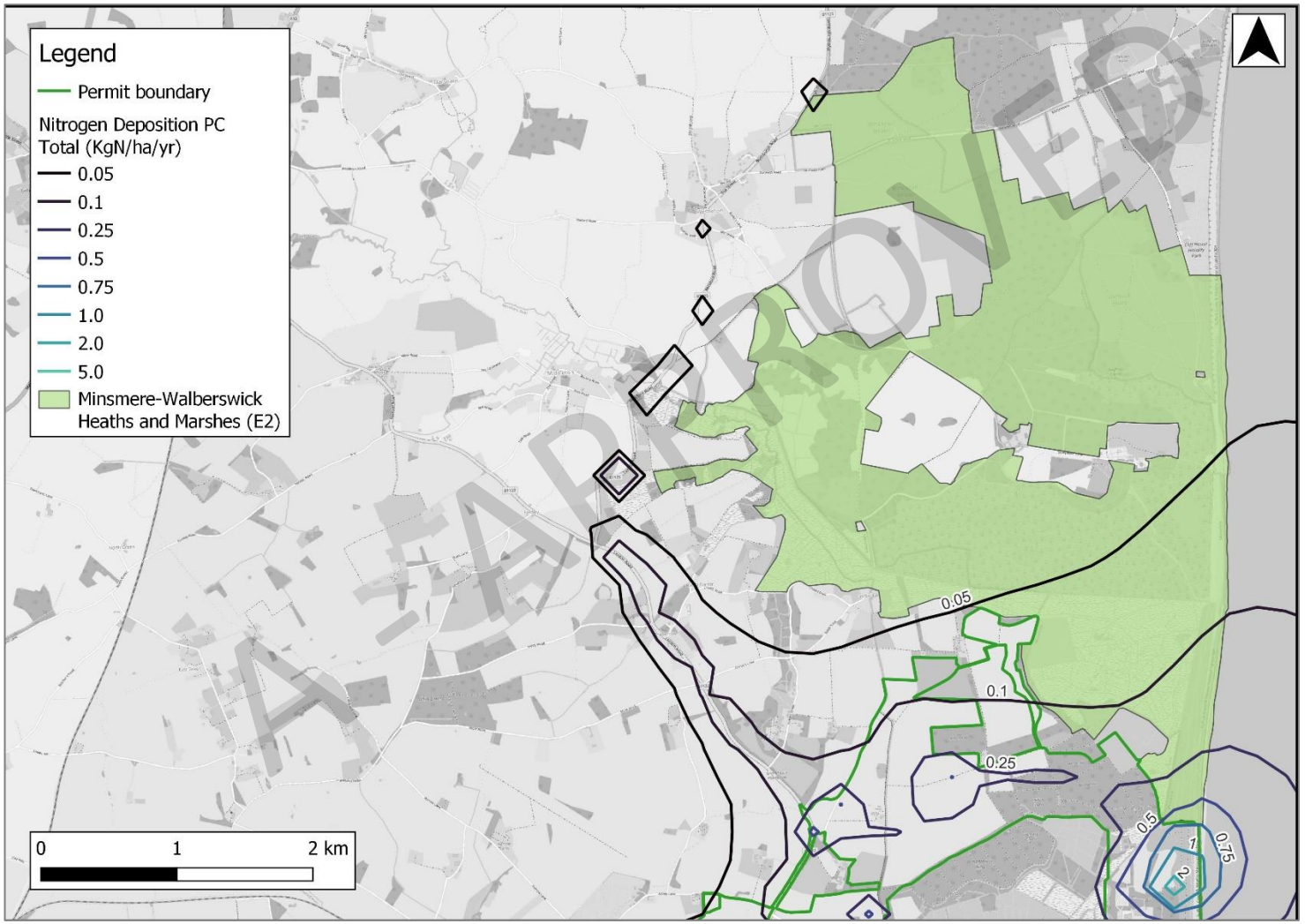


Ammonia 'in combination' isolpleths for Leiston-Aldeburgh (Northern Section)/Sandlings SPA

Nitrogen 'alone' isopleths for Minsmere-Walberswick



Nitrogen 'in combination' isopleths for Minsmere-Walberswick

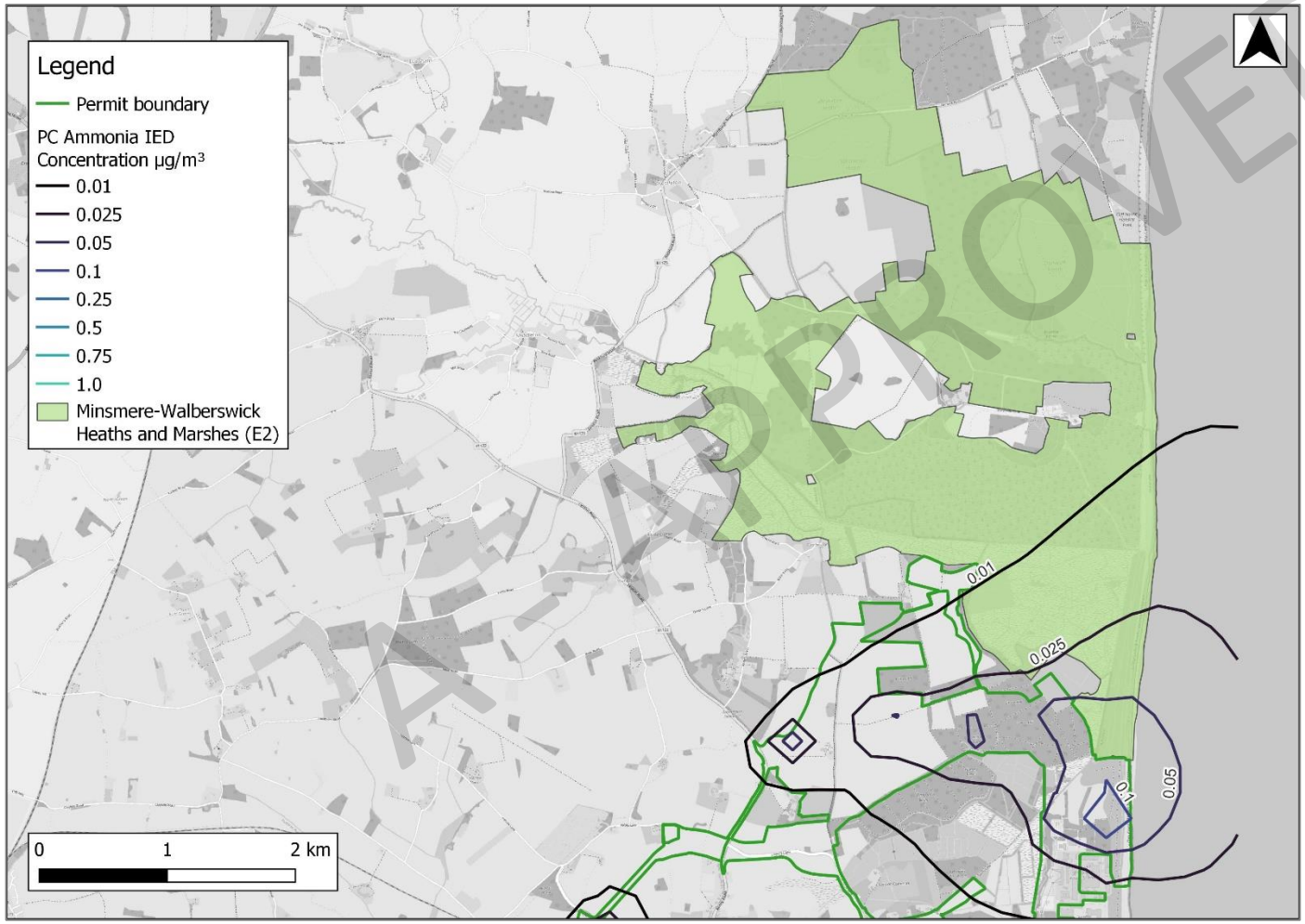


Nitrogen 'alone' isopleths for Leiston-Aldeburgh (Northern Section)/Sandlings SPA

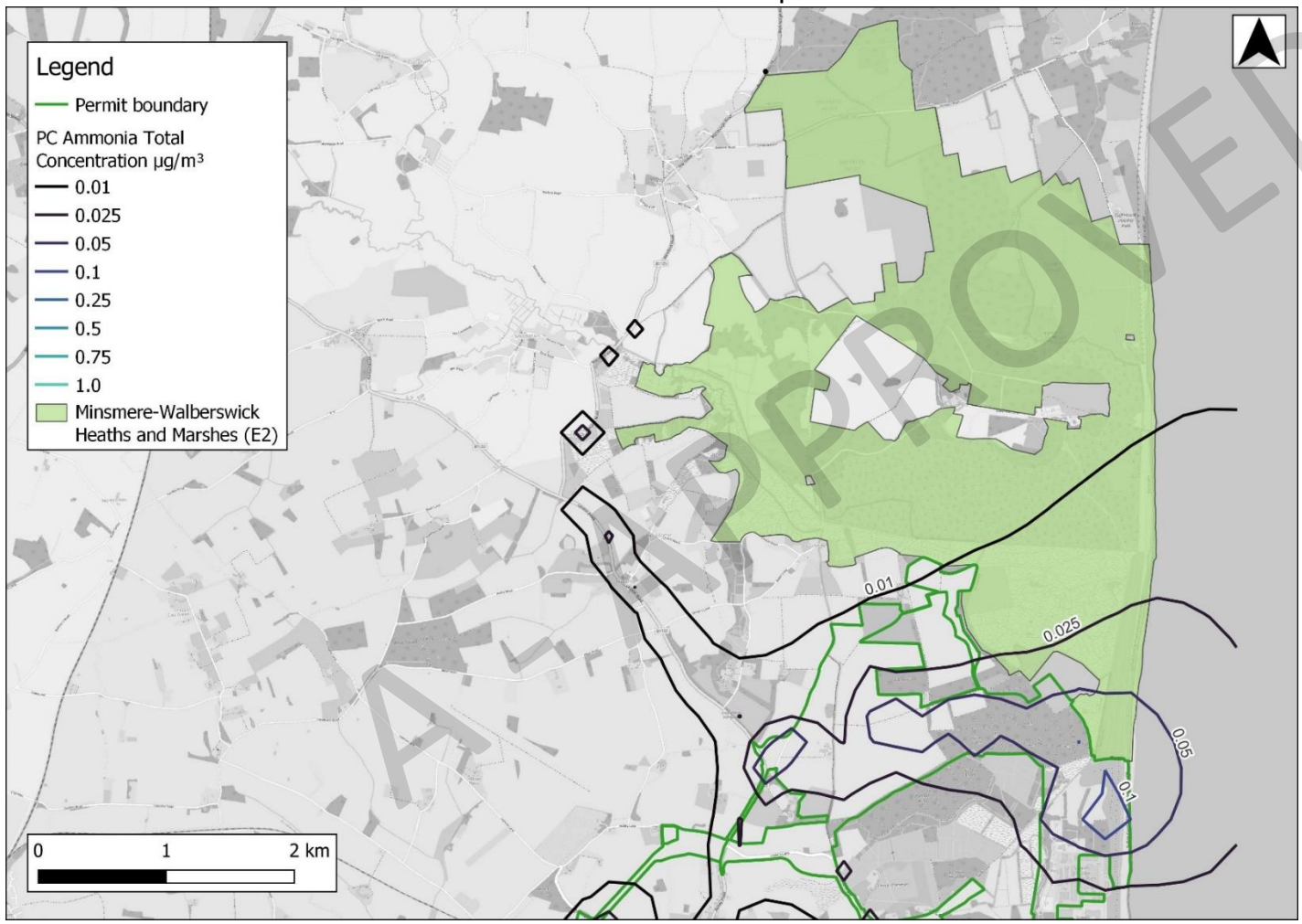
Nitrogen 'in combination' isopleths for Leiston-Aldeburgh (Northern Section)/Sandlings SPA

A.1.2 Scenario 1A (EW 2025)

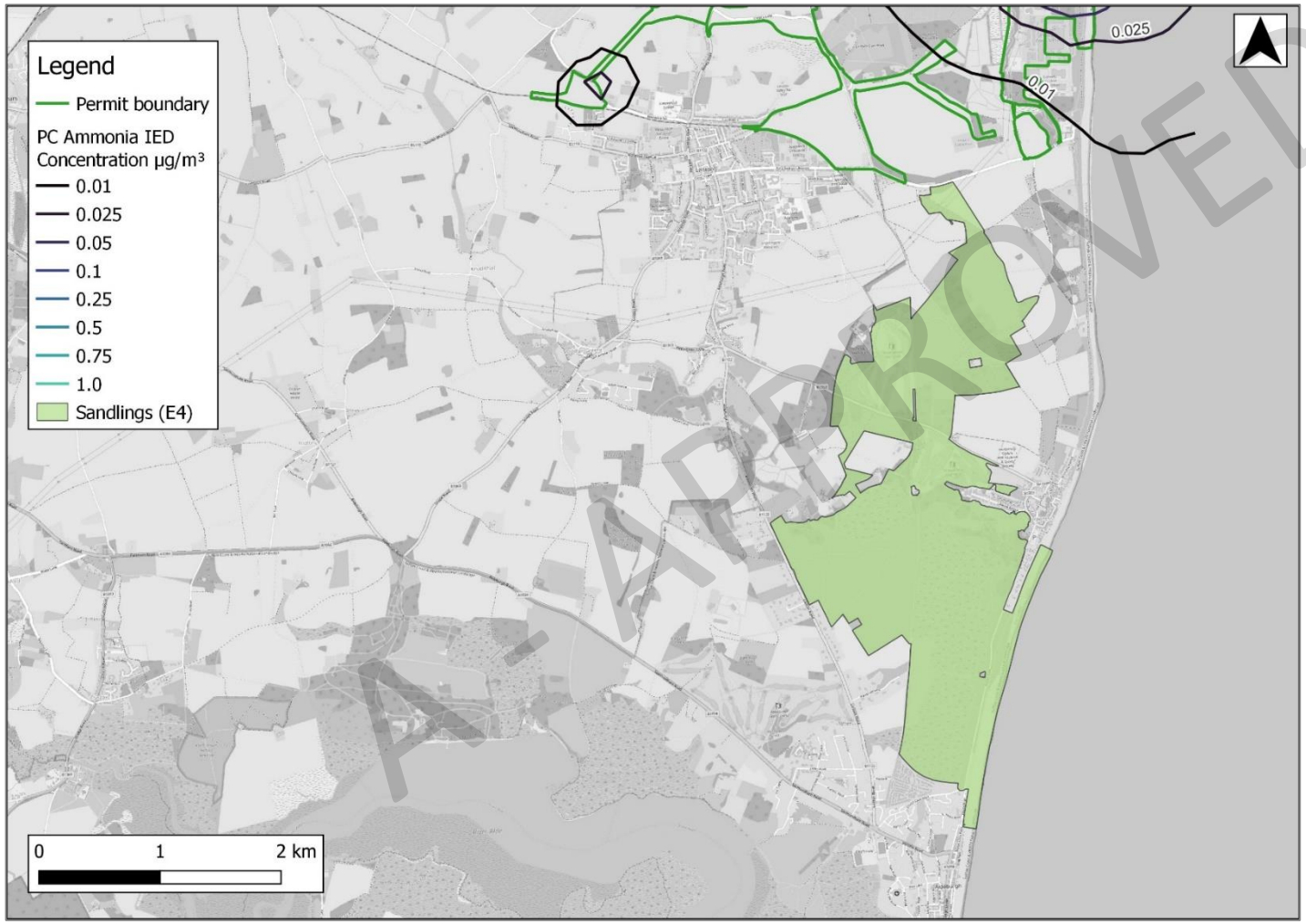
Ammonia 'alone' isopleths for Minsmere-Walberswick



Ammonia 'in combination' isolpleths for Minsmere-Walberswick

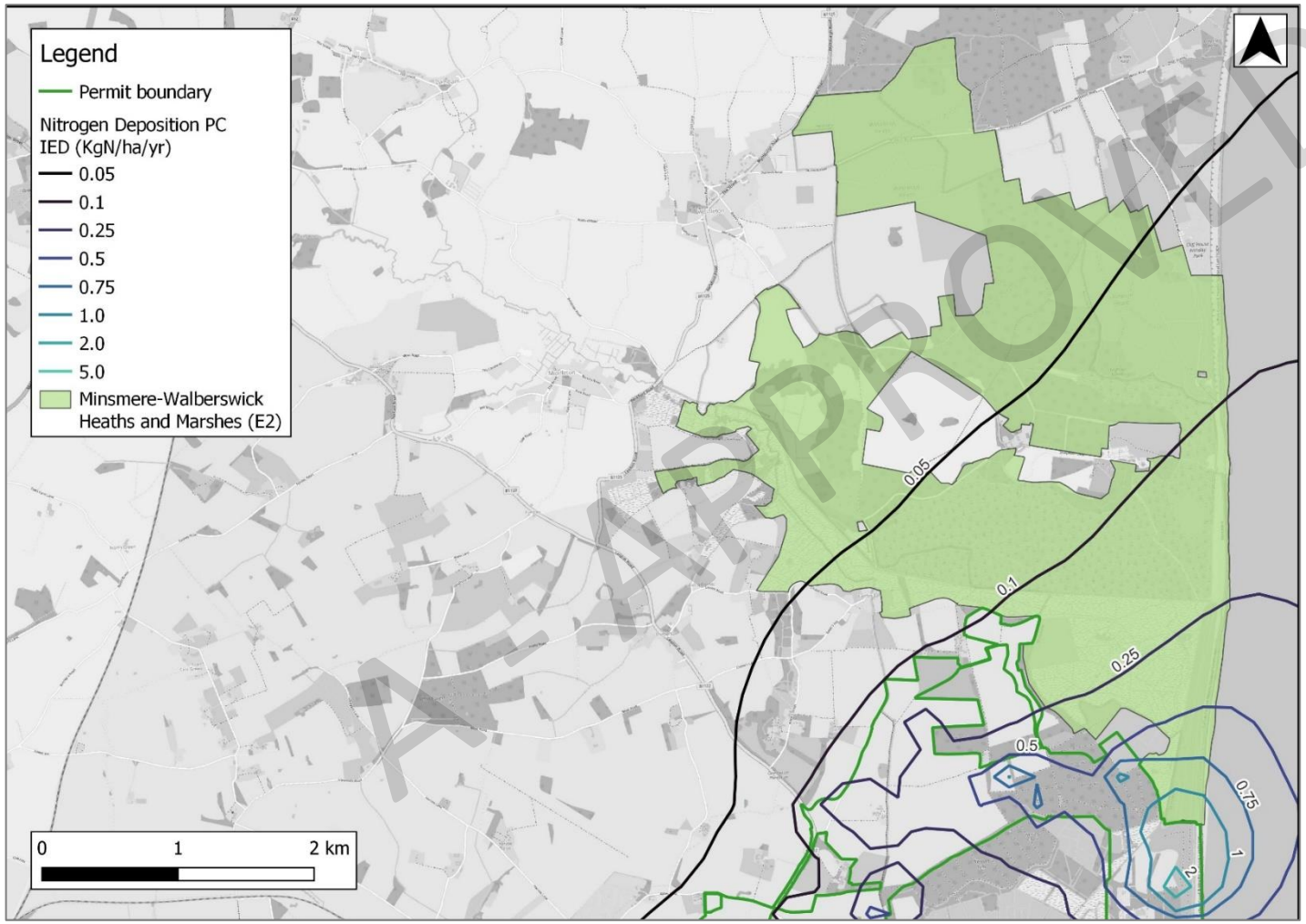


Ammonia 'alone' isopleths for Leiston-Aldeburgh (Northern Section)/Sandlings SPA

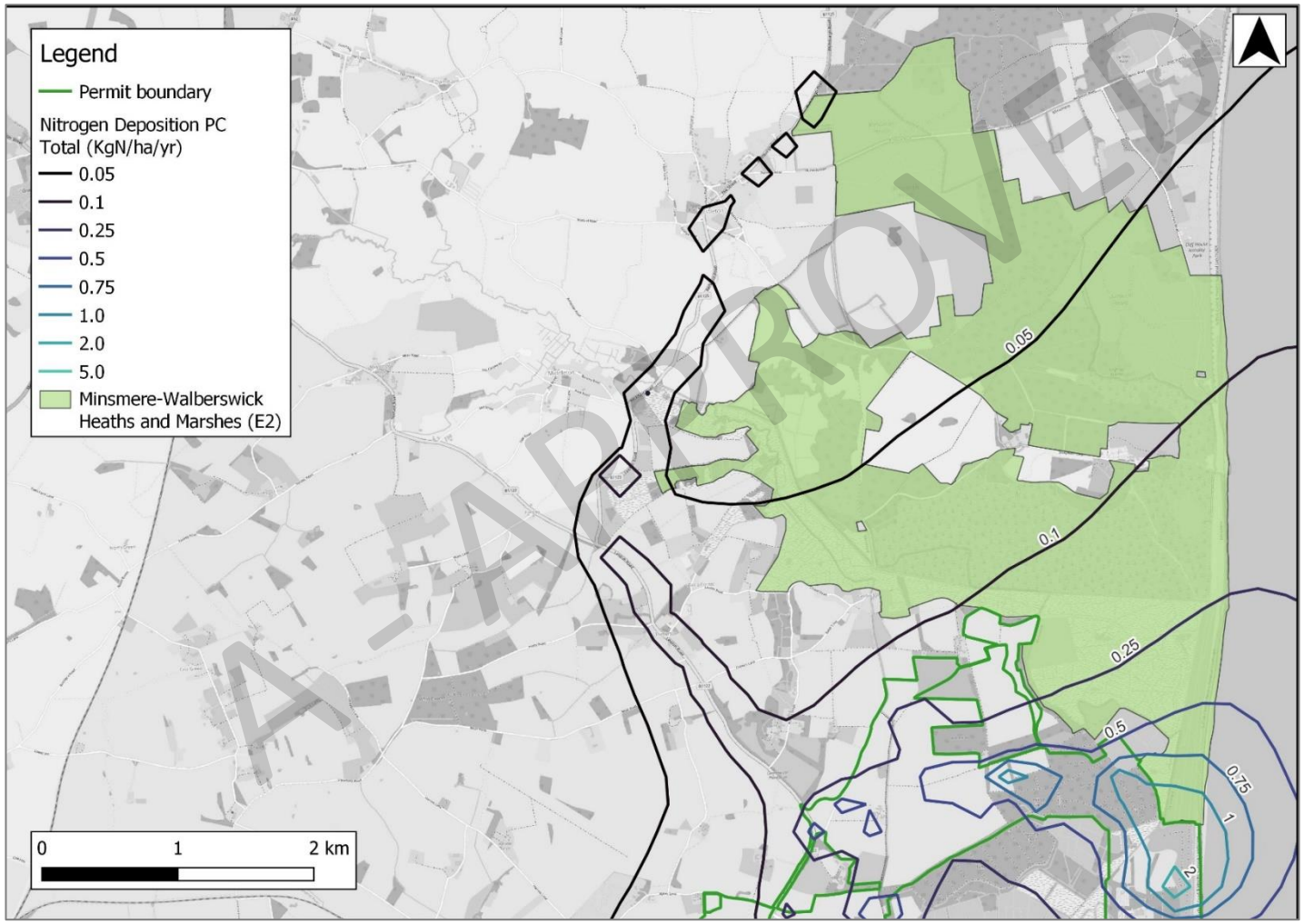


Ammonia 'in combination' isolpleths for Leiston-Aldeburgh (Northern Section)/Sandlings SPA

Nitrogen 'alone' isopleths for Minsmere-Walberswick



Nitrogen 'in combination' isopleths for Minsmere-Walberswick

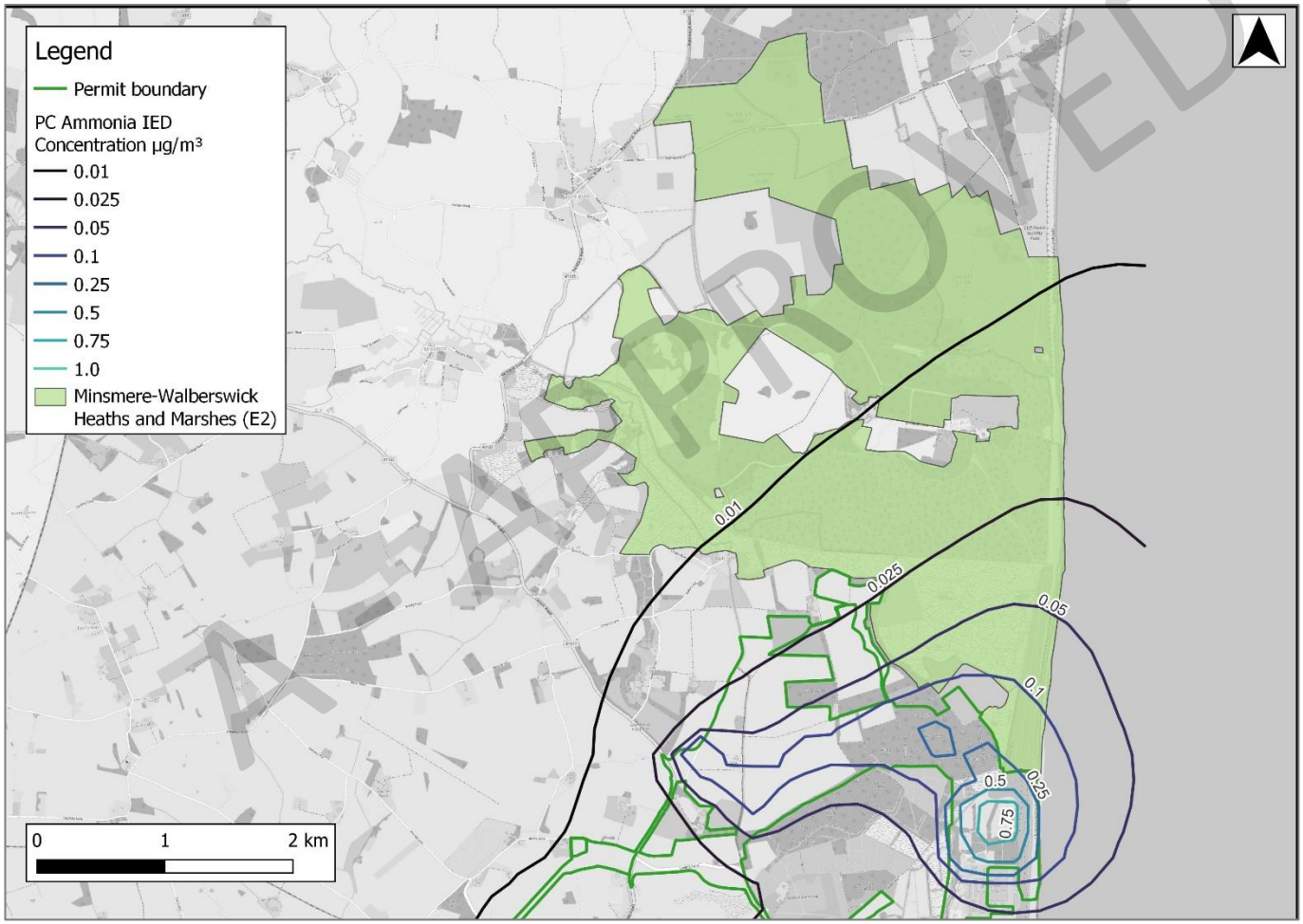


Nitrogen 'alone' isopleths for Leiston-Aldeburgh (Northern Section)/Sandlings SPA

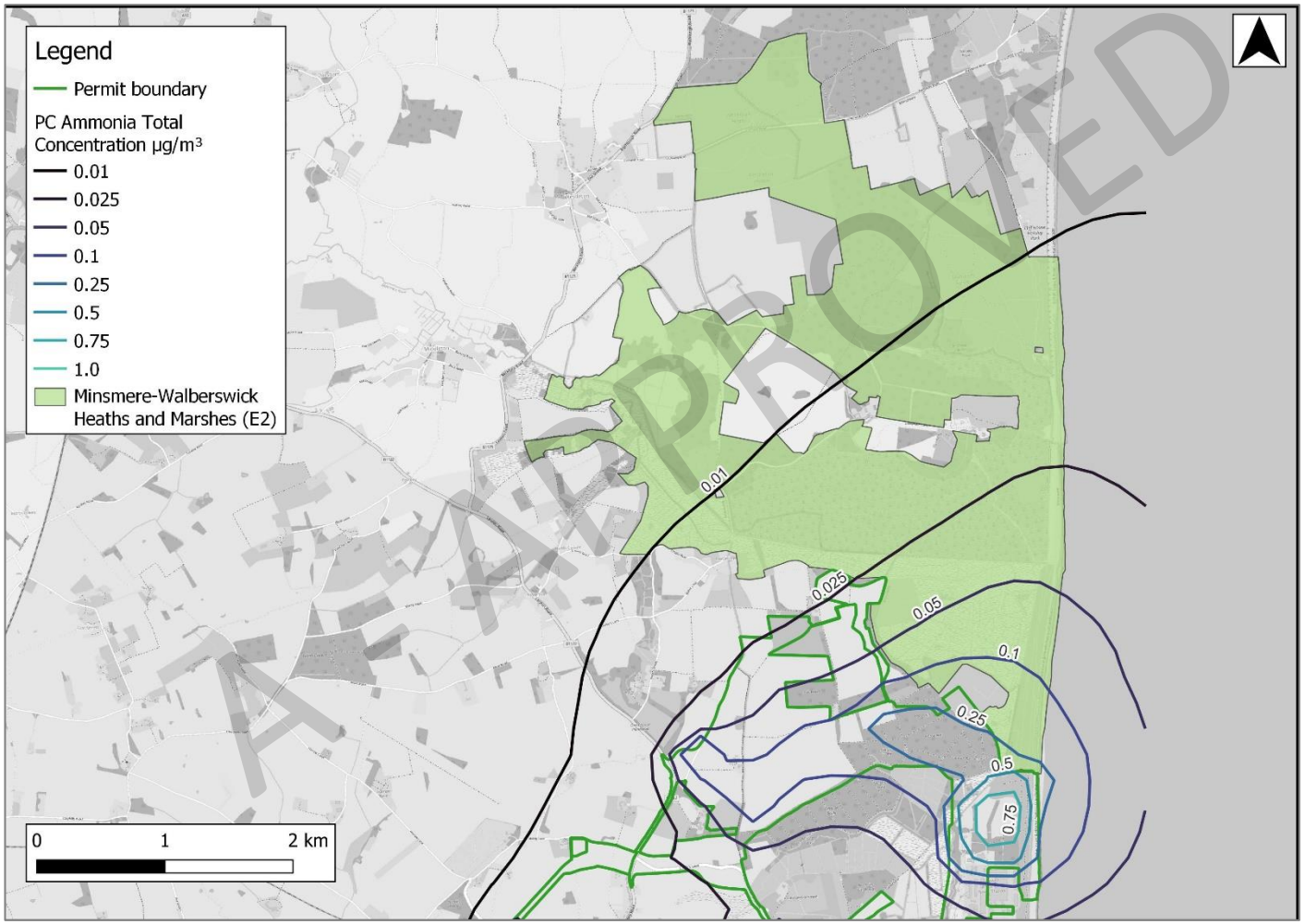
Nitrogen 'in combination' isopleths for Leiston-Aldeburgh (Northern Section)/Sandlings SPA

A.1.3 Scenario 2E

Ammonia 'alone' isopleths for Minsmere-Walberswick



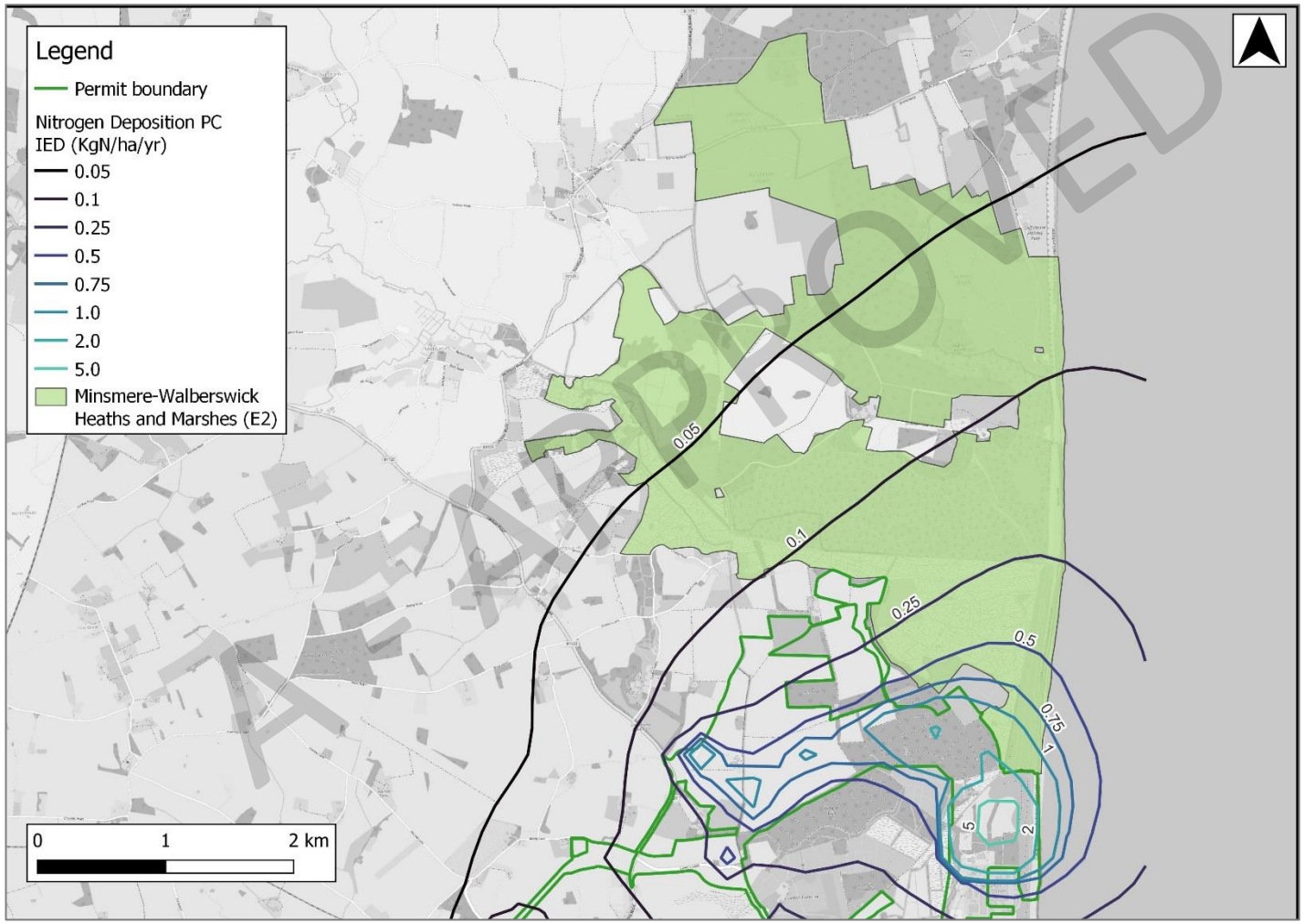
Ammonia 'in combination' isolpleths for Minsmere-Walberswick



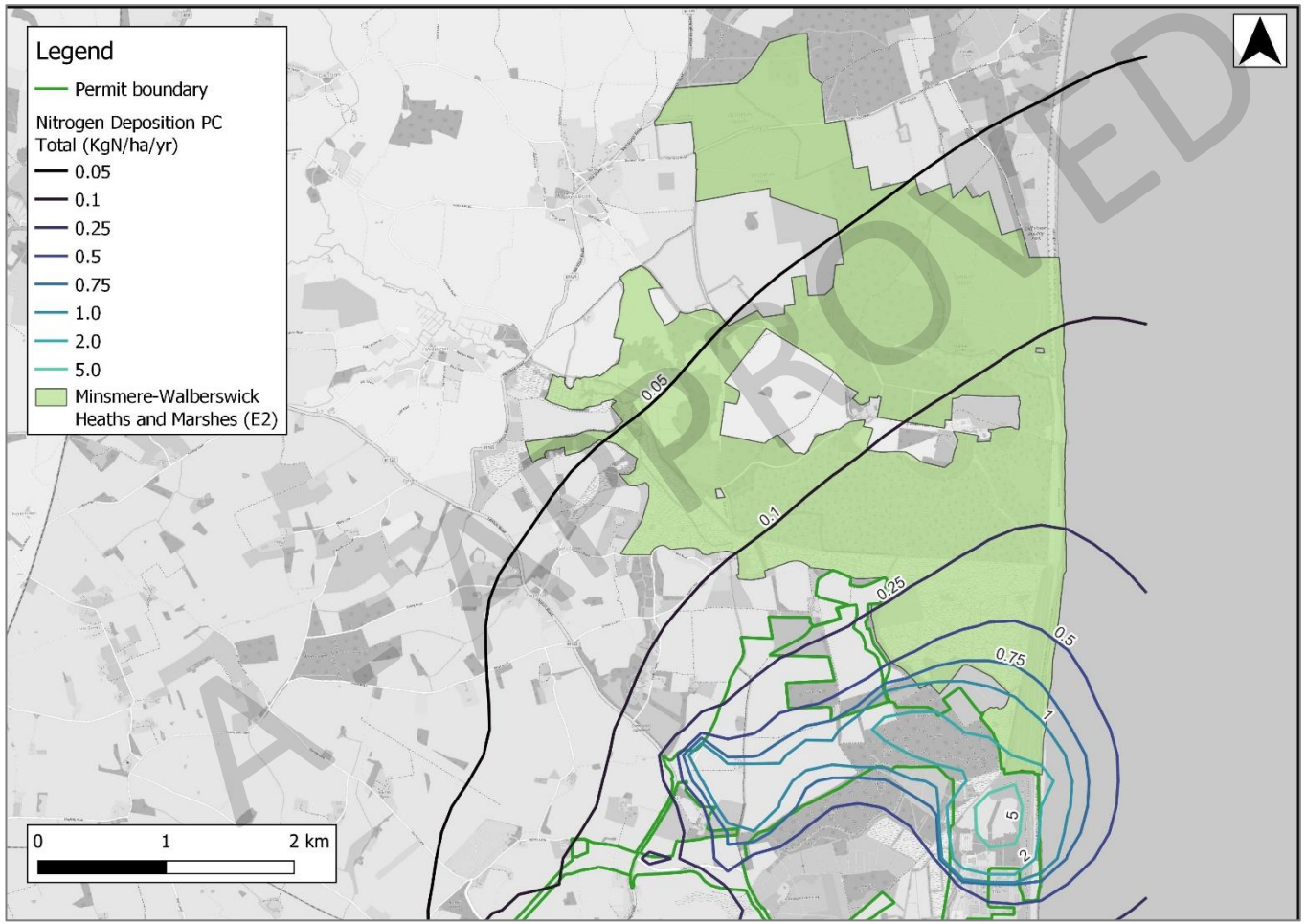
Ammonia 'alone' isopleths for Leiston-Aldeburgh (Northern Section)/Sandlings SPA

Ammonia 'in combination' isolpleths for Leiston-Aldeburgh (Northern Section)/Sandlings SPA

Nitrogen 'alone' isopleths for Minsmere-Walberswick



Nitrogen 'in combination' isopleths for Minsmere-Walberswick



Nitrogen 'alone' isopleths for Leiston-Aldeburgh (Northern Section)/Sandlings SPA

Nitrogen 'in combination' isopleths for Leiston-Aldeburgh (Northern Section)/Sandlings SPA

9 ANNEX 1: CONSTRUCTION PERMITTING COUNTRYSIDE RIGHTS OF WAY (CROW) ACT REVIEW

Document Reference 101254844
Revision 01

Sizewell C
The power of good for Britain

Sizewell C Project

Combustion Activity Permit Application

Annex 1: Construction Permitting Countryside Rights of Way (CRoW) Act Review

DOCUMENT CONTROL

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Prepared by:	[redacted] Technical Director
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Reviewed by:	[redacted] Environment Consents and Permits Delivery Lead
Approved by:	[redacted] Environment Manager - Construction Permits and Consents

REVISION HISTORY

Rev	Status	Amendment	Prepared By	Date
01	Final	First Draft	[redacted]	11/04/2024

ANNEX 1: COUNTRYSIDE RIGHTS OF WAY (CROW) ACT REVIEW

CONTENTS

1 INTRODUCTION

1.1 Overview

1.1.1 The Sizewell C Project ('SZC Project') is a consented nuclear power station[1]. It will consist of two UK European Pressurised Reactors™ which will be immediately north of the existing Sizewell B power station in Suffolk. The Development Consent Order (DCO) for the SZC Project was granted in 2022[2] . The DCO was granted based on assessment work (underpinned by extensive baseline surveys and studies) and submitted to the Secretary of State.

1.1.2 The SZC Project is currently preparing construction permit applications. These permits are required for several of the works and construction activities. Construction permits are required for a number of project-related activities (including, for example, water discharges and realignment of channels), several of which have Countryside Rights of Way 2000 (CRoW) Act considerations due to the proximity of the SZC Project to one or more Sites of Special Scientific Interest (SSSI).

1.1.3 This CRoW Assessment considers potential impacts on SSSIs as a result of permits concerning the air emissions and disturbance from noise associated with diesel generators, having regard to the outcome of the DCO. Potential effects associated with the proposed activities relevant to construction permits were taken into account within the DCO. Consequently, and as explained above, the assessment for these permits is undertaken with cognisance of the outcome of the DCO but reflect the (inevitable) greater degree of resolution on the activities relevant to each permit that is now available.

1.1.4 This CRoW Assessment sits as a standalone document to assess the potential impacts on SSSIs in accordance with the CRoW Act 2000. It is noted that where a Habitats Regulations Assessment (HRA) is required, this assessment shall be appended to the relevant HRA for the permits being considered. The air quality modelling data discussed in this report are contained in the separate Air Emission Risk Assessment (Appendix C of the Supporting Information Document), while isopleth maps discussed in this report are presented in the appendices to this document.

1.2 Definitions

Term / Abbreviation	Definition
ADs	Associated Developments
AERA	Air Emission Risk Assessment
APIS	Air Pollution Information System
CRoW Act	Countryside Rights of Way 2000 Act
DCO	Development Consent Order (DCO)

[1] The Sizewell C (Nuclear Generating Station) Order 2022. Available online at: https://www.legislation.gov.uk/uksi/2022/853/contents/made. [Accessed 28/02/2024]

[2] The Sizewell C (Nuclear Generating Station) Order 2022. Made 20th July 2022, Coming into force 11th August 2022. Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010012/EN010012-011165-SZC-DCO.pdf. [Accessed 28/02/2024]

ANNEX 1: COUNTRYSIDE RIGHTS OF WAY (CROW) ACT REVIEW

Term / Abbreviation	Definition
EW	Early Works
EA	Environment Agency
EIA	Environmental Impact Assessment
kgN/ha/yr	(kilograms) of nitrogen over a given area (hectare) per year
MWth	Megawatt Thermal
NH_3	Ammonia
NRMM	Non Road Mobile Machinery
NOx	Oxides of Nitrogen
PC	Process Contribution
PEC	Predicted Environmental Concentration
SSSI	Sites of Special Scientific Interest
SZC	Sizewell C Ltd
SZC Project	Sizewell C Project
SO_2	Sulphur Dioxide

2 PERMIT DETAILS AND DESCRIPTION OF PROPOSAL

2.1 Permit Details

2.1.1 The permit associated is for an installation activity environmental permit, EPR Schedule 1, Section 1.1A(1)(a): Burning of any fuel in an appliance with a rated thermal input of 50 MW or more. This will be Permit MDS/CAP/1.

2.2 Description of Proposal

2.2.1 The assessment concerns any risks that are posed to the integrity and quality of any relevant SSSIs due to the air emissions that would be produced by the diesel generators on site. Three scenarios have been considered in this assessment:

- **Early Works (EW) Scenario 1A 2024**: generators for welfare and general construction needs, use and relevant Associated Developments (ADs) for 2024. The modelled results for this scenario are presented in in the Air Emission Risk Assessment (AERA) (Appendix C of the Supporting Information Document) within Appendix C. Within the AERA this is referred to as ***Early Works 2024***.
- **EW Scenario 1A 2025**: generators for welfare and general construction needs, use and relevant ADs for 2025. The modelled results for this scenario are presented in in AERA within Appendix C. Within the AERA this is referred to as ***Early Works 2025***.
- **Peak Construction Scenario 2E:** package substations with hybrid/battery use with 50 Megawatt Thermal (MWth) power demand and relevant ADs generators. This scenario represents the reasonable worst-case scenario and will form the basis of the Air Quality Assessment to be submitted with the permit application. The modelled results for this scenario are presented in in AERA this is referred to as '***Scenario 1***' in the modelling report.

2.2.2 Note that the emissions from these scenarios will be temporary, with an overall emissions period of approximately three years. The analysis presented in this report draws upon the modelling work presented in the AERA (Appendix C of the Supporting Information Document).

3 SCREENING PROCESS

3.1 Introduction

3.1.1 The purpose of screening is to determine whether there will be any potential significant effects on the designated SSSIs resulting from the implementation of the permit under consideration. This acts as a high-level 'filter' for identifying positive effects which may occur, primarily based on established buffer zones / search areas. These search areas are defined based on the type of permit being applied for, and the activities which form part of the planned works. This initial search allows the assessment stage to then focus on the relevant SSSIs only, their associated qualifying features and potential impacts on them. Where no clear pathway of effect between the permitted works and SSSIs is identified (i.e., there is no overlap between the search area and the designated site), those SSSI are screened out of the process. In addition, not all qualifying features of a designated site may have the potential to be affected, despite geographical proximity, due to the nature of the works. This is also considered as appropriate within the screening process.

3.1.2 The key steps of the screening process are:

1. Identification of relevant designated sites and their qualifying features;
2. Review of the type and timing of the permit being applied for;
3. Review of the activities proposed under the permit, and potential effects which may arise as a result; and
4. Review of existing baseline and assessment information to ascertain whether there is the potential for significant effects to arise on the SSSI as a result of the permit activities.

3.1.3 There is specific detailed guidance on identifying potential effects from combustion permits produced by the Environment Agency (EA). Ecological receptors were identified following the EA's guidance[3] which states that any Sites of Special Scientific Interest (SSSI) and Local Nature Sites within 2km need to be considered. For Local Nature Sites the Environment Agency guidance states that if the short term Process Contribution (PC) is less than 100% of the short term environmental standard for protected conservation areas, and the long term PC is less than 100% of the long term environmental standard for protected conservation areas, there is no need to consider these sites further. These criteria are met for all Local Nature Sites. Therefore, this assessment focusses on SSSIs.

3.1.4 The findings of the screening were therefore that the following SSSIs need consideration:

- Sizewell Marshes SSSI (adjacent to the permit location).
- Minsmere to Walberswick SSSI (adjacent to the permit location); and
- Leiston-Aldeburgh SSSI (0.23km south of the permit location).

3.1.5 A review of the potential impacts of the proposed permit works on these SSSIs in relation to the qualifying features of the site is presented in Sections 5 and 6.

[3] https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit

4 BASELINE

4.1 Sizewell Marshes SSSI

4.1.1 The citation for Sizewell Marshes SSSI highlights the large area of unimproved lowland wet meadows, and the importance of this habitat in supporting the assemblage of invertebrates and breeding birds present within the site.

4.1.2 The site has seven identified features as listed in the table below:

Table 1. Table showing the features present within Sizewell Marshes SSSI and their condition.

Feature	Condition
Assemblage of breeding birds – Lowland damp grasslands	Favourable
Ditches	Favourable
Floodplain fen (lowland)	Favourable
Invertebrate assemblage W211 – Open water on disturbed sediments	Unfavourable – Recovering
Invertebrate assemblage W314 reed-fen & pools	Favourable
Lowland mire grassland and rush pasture	Favourable
Vascular plant assemblage	Not recorded

4.1.3 Surveys were undertaken to characterise Sizewell Marshes SSSI and to identify the likely impacts of works that would affect the SSSI. Baseline surveys and assessments of Sizewell Marshes undertaken as part of the DCO Environmental Impact Assessment (EIA), inform the assessment of potential impacts from the SZC development on the SSSI and the provision compensatory habitats in line with the loss of habitats within the SSSI. The habitats within the SSSI are noted as being of National Importance, including the wetland habitats, which includes wet woodland, reedbed and fen meadow[4] .

4.1.4 Wet Woodland is noted as being present within the SSSI, though it is not a qualifying feature. However, it partly supports the invertebrate assemblage designated feature and therefore is included as part of the assessment.

4.1.5 Valued wetland invertebrate assemblages are well represented across Sizewell Marshes SSSI.

4.2 Minsmere to Walberswick Heaths and Marshes SSSI

4.2.1 The citation for Minsmere to Walberswick Heaths and Marshes SSSI highlights the extensive reedbeds, tidal mudflats, and the shingle beaches which support a variety of scarce shingle plants.

4.2.2 The site has the identified features as listed in the table below:

Table 2. Table showing the features present within Minsmere to Walberswick Heaths and Marshes SSSI and their condition.

Feature	Condition
Aggregations of breeding birds – Avocet	Favourable

[4] SZC Co (2020) – Volume 2, Chapter 14 Terrestrial Ecology and Ornithology.

ANNEX 1: COUNTRYSIDE RIGHTS OF WAY (CROW) ACT REVIEW

Feature	Condition
Aggregations of breeding birds - Bearded tit	Unfavourable – Declining
Aggregations of breeding birds - Bittern	Favourable
Aggregations of breeding birds - Cetti's warbler	Favourable
Aggregations of breeding birds - Gadwall	Favourable
Aggregations of breeding birds - Garganey	Favourable
Aggregations of breeding birds - Marsh harrier	Favourable
Aggregations of breeding birds - Nightjar	Favourable
Aggregations of breeding birds - Shoveler	Favourable
Aggregations of breeding birds - Teal	Unfavourable – No change
Aggregations of breeding birds - Tufted duck	Not recorded
Aggregations of breeding birds - Water rail	Unfavourable – Declining
Aggregations of breeding birds - Woodlark	Favourable
Aggregations of non-breeding birds - Dunlin	Favourable
Aggregations of non-breeding birds - Redshank	Favourable
Aggregations of non-breeding birds - variety of passage species	Not recorded
Aggregations of non-breeding birds - variety of wintering species	Not recorded
Assemblages of breeding birds - Lowland damp grasslands	Unfavourable – Declining
Assemblages of breeding birds - variety of species	Favourable
Coastal vegetated shingle (SD1-3)	Partially Destroyed
Ditches	Not recorded
Fixed dune grassland	Favourable
Floodplain fen (lowland)	Not recorded
Invert. assemblage F111 bare sand & chalk	Favourable
Invert. assemblage F112 open short sward	Favourable
Littoral sediment	Not recorded
Lowland calcareous grassland (CG7)	Favourable
Lowland dry acid grassland (U1b,c,d,f)	Not recorded
Lowland dry acid grassland (U4)	Not recorded
Lowland dry heath	Not recorded
Mire grasslands and rush pastures (upland)	Not recorded
Population of Schedule 8 plant - Filago lutescens, Red-tipped Cudweed	Not recorded
Saline coastal lagoons	Not recorded
Sand dune; strandline, embryo and mobile dunes (SD1-6)	Favourable
SM4-28 - Saltmarsh	Not recorded
Vascular plant assemblage	Not recorded
Wet woodland	Unfavourable - Recovering

4.2.3 Surveys were undertaken to characterise Minsmere to Walberswick Heaths and Marshes SSSI and to identify the likely impacts of works that would affect the SSSI. Baseline surveys and assessments of Sizewell Marshes undertaken as part of the DCO EIA, inform the assessment of potential impacts from the SZC development on the SSSI and the provision compensatory habitats in line with the loss of habitats within the SSSI.

4.2.4 The invertebrate assemblages found within the designation mirror those within the Sizewell Marshes SSSI, with the complex matrix of wetland habitats and dry sandy habitats providing habitat for species with recognised conservation value.

4.2.5 Minsmere to Walberswick Heaths and Marshes SSSI comprises a range of habitat types supporting a diverse assemblage of breeding, passage and wintering bird species. Species listed as forming part of the Minsmere to Walberswick Heaths and Marshes SSSI qualification include bittern, gadwall, teal, shoveler, marsh harrier, avocet and bearded tit Panurus biarmicus. Collectively these species constitute a valuable breeding and wintering waterbird assemblage which could utilise habitats within, or adjacent to the site.

4.3 Leiston-Aldeburgh SSSI

4.3.1 The citation for Leiston-Aldeburgh SSSI highlights the rich mosaic of habitats including acid grassland, heath, scrub, woodland, fen, open water and vegetated shingle. This mix of habitats in close juxtaposition and the associated transition communities between habitats is unusual in the Suffolk Coast and Heaths. The variety of habitats support a diverse and abundant community of breeding and overwintering birds, a high number of dragonfly species and many scarce plants.

4.3.2 The site has the identified features as listed in the table below:

Table 3. Table showing the features present within Leiston-Aldeburgh SSSI and their condition.

Feature	Condition
Aggregations of breeding birds - Gadwall, *Mareca strepera*	Favourable
Aggregations of breeding birds - Marsh harrier, *Circus aeruginosus*	Favourable
Aggregations of breeding birds - Woodlark, *Lullula arborea*	Unfavourable declining
Aggregations of non-breeding birds - Gadwall, *Mareca strepera*	Unfavourable declining
Aggregations of non-breeding birds - Shoveler, *Anas clypeata*	Favourable
Aggregations of non-breeding birds - White-fronted goose, *Anser albifrons albifrons*	Favourable
Assemblages of breeding birds - Lowland damp grasslands	Not recorded
Assemblages of breeding birds - Lowland open waters and their margins	Not recorded
Assemblages of breeding birds - variety of species	Not recorded
Coastal vegetated shingle (SD1-3)	Unfavourable no change
Ditches	Not recorded
Lowland dry acid grassland (U1b,c,d,f)	Not recorded
Lowland dry heath	Not recorded
Lowland wetland including basin fen, valley fen, floodplain fen, waterfringe fen, spring/flush fen and raised bog lagg	Not recorded
Outstanding dragonfly assemblage	Not recorded
Vascular plant assemblage	Not recorded

ANNEX 1: COUNTRYSIDE RIGHTS OF WAY (CROW) ACT REVIEW

Feature	Condition
Wet woodland	Favourable

5 SCREENING ASSESSMENT

5.1 Noise Impacts

5.1.1 Leiston-Aldeburgh SSSI is c.500m from the nearest generator location and therefore will not be affected by generator noise. Minsmere to Walberswick Heaths and Marshes SSSI and Sizewell Marshes SSSI are closer to some generator locations and may therefore be within the zone of influence of noise impacts.

5.1.2 The DCO sHRA, which considered the same interest features as present within the SSSI, recognised that the noise sensitivity thresholds above which a potentially adverse behavioural response may be observed for foraging marsh harrier and non-breeding waterbirds (70dB Lamax) and breeding waterbirds (65dB Lamax) were suitably precautionary. These sensitivity thresholds are based on sudden impulsive, or impact sounds, such as hammering, as opposed to continuous (largely non-impulsive) noise. This is because impulsive noises are considered more likely to lead to behavioural responses by birds.

5.1.3 The use of the generator for (up to) three years could result in temporary noise impacts above the 65dB level described above. However, there is no impulsive-type noise generated (on which the disturbance thresholds that informed the DCO sHRA are based) and, therefore, noise levels during the operation of the generator are expected to be well below the level at which disturbing effects could occur within very close proximity (tens of metres) of the source. There is a possibility that foraging Marsh Harrier, Gadwall or Shoveler may be present and foraging within the (tens of metres) zone of influence. However, the spatial zone of potential disturbance effect from the generator alone is considered insignificant in the context of the wider areas of habitat used by these species. It is therefore considered that the effects of disturbance alone would not result in any adverse effects. Signfiicant effects from noise are therefore dismissed.

5.2 Relevant pollutants and assessment thresholds

5.2.1 There are two mechanisms for atmospheric pollutant impact which are modelled using standard forecasting. The first is the concentration of pollutants in the atmosphere, in this case specifically oxides of nitrogen (known as NOx), ammonia (NH3), and sulphur dioxide (SO_2). At high concentrations NOx can be directly toxic to vegetation but its main importance is as a source of nitrogen, which is then deposited on adjacent habitats[5] . Ammonia can be directly toxic to vegetation in relatively low concentrations, particularly to lower plants (lichens and bryophytes).

5.2.2 The second important set of pollutants is a measure of the rate of the resulting nitrogen (and acid where relevant) deposition. The addition of nitrogen is a form of fertilization, which can have a negative effect on most habitats over long time periods in particular by encouraging more competitive plant species that can force out the less competitive species that are more characteristic. Unlike NOx in atmosphere, the nitrogen and acid deposition rate below which we are confident effects would not arise is different for each habitat. The rate (known as the critical load) is provided on the UK Air Pollution Information System (APIS) website (www.apis.ac.uk) and is expressed as a quantity (kilograms) of nitrogen over a given area (hectare) per year (kgN/ha/yr).

[5] For example, the APIS website states that '*It is likely that the strongest effect of emissions of nitrogen oxides across the UK is through their contribution to total nitrogen deposition…*' http://www.apis.ac.uk/overview/pollutants/overview_NOx.htm

5.2.3 To identify sensitivity thresholds for vegetation a system of critical levels (for pollutants in atmosphere) and critical loads (for the resulting nitrogen and acid deposition) have been devised. These are defined as follows[6] :

- Critical loads are defined as: "*a quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge*".
- Critical levels are defined as "*concentrations of pollutants in the atmosphere above which direct adverse effects on receptors, such as human beings, plants, ecosystems or materials, may occur according to present knowledge*".

5.2.4 Where the critical level or critical load are exceeded, the following considerations are relevant in ecological interpretation[7] :

- Paragraph 5.26 of Natural England guidance on the issue states that 'An exceedance [of the critical level or load] *alone is insufficient to determine the acceptability (or otherwise) of a project'*. Therefore, the fact that the critical level or critical load is already exceeded is not a legitimate basis to conclude that any further pollution (no matter how small) will result in an adverse effect;
- Paragraph 4.25 of the same NE guidance states '*…1% of critical load/level are considered by Natural England's air quality specialists (and by industry, regulators and other statutory nature conservation bodies) to be suitably precautionary, as any emissions below this level are widely considered to be imperceptible…There can therefore be a high degree of confidence in its application to screen for risks of an effect'*. The '1% of the critical level/load' criterion is therefore a commonly used initial screening threshold and is used as such in this report. Note that for short-term (24hr) NOx a 10% of the critical level screening threshold is used, reflecting that long-term exposure to NOx is likely a greater risk to designated sites than short term exposure.

5.2.5 At the same time, Natural England's guidance makes it clear that exceedance of these thresholds does not automatically mean an adverse effect on integrity will arise. Paragraph 5.28 of that guidance states '*In practice, where a site is already exceeding a relevant benchmark, the extent to which additional increments from plans and projects would undermine a conservation objective to 'restore'* [or maintain, although this is not specifically stated] *will involve further consideration of whether there is credible evidence that the emissions represent a real risk that the ability of other national or local measures and initiatives to otherwise reduce background [pollutant] levels will be compromised in a meaningful manner'*. This will include consideration of factors such as the duration of exposure, the magnitude of exposure and how pollution affects the functioning of the habitats.

5.2.6 The Environment Agency guidance previously cited includes a criterion as to whether the Predicted Environmental Concentration (PEC) (i.e. the PC for the activity being applied for, plus the background pollution, plus any other relevant sources of pollution not yet reflected in the background) or PEC exceeds 20% (for short term) or 70% (for long term) of the critical level or critical load. However, this criterion is not

[6] https://www.icpmapping.org/Definitions_and_abbreviations

[7] Taken from 'Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations. Version: June 2018'. While this was specifically produced for internationally important wildlife sites, and for road traffic, the basic interpretive principles apply to SSSIs and sources of pollution other than road traffic: http://publications.naturalengland.org.uk/publication/4720542048845824.

a damage threshold, it is simply an indicator that detailed dispersion modelling is required. In this case such modelling has already been undertaken so the 70% threshold is not relevant to ecological interpretation.

5.2.7 In the air quality modelling undertaken for this HRA Report separate PCs have been calculated for the generators (for which a permit is being sought) and, in order to meet the HRA legal requirement to consider impacts 'in combination' with other sources of emission, for the Non Road Mobile Machinery (NRMM) and the construction traffic for the SZC project as a whole. These have therefore been summed to provide an 'in combination' PC. When combined with the background concentrations or deposition rates they provide the PEC.

5.2.8 Note that in the Air Quality Modelling Report that forms Appendix C of the Supporting Information Document acid deposition is reported as either 'not applicable' (as not all SSSIs have applicable critical loads for acidity) or 'No PC Exceedances' for each receptor. Therefore, acidity is not discussed further in this report which focusses on NOx, ammonia and nitrogen deposition.

5.3 Appropriate critical levels and critical loads

5.3.1 Critical levels for NOx and SO_2 are fixed and applicable to all habitats: 30 μgm^{-3} for annual NOx, 20 μgm^{-3} for annual SO_2, and 75 μgm^{-3} for short-term (24hr) NOx. The appropriate critical level for ammonia depends on whether lichens or bryophytes of relevance to the conservation status of the habitat are likely to be present. If they are an important part of the ecosystems integrity, then then a more stringent critical level of 1 μgm^{-3} is appropriate. If they are unlikely to be present or an interest of the designated site, then a higher critical level of 3 μgm^{-3} is appropriate. For the purposes of the air quality modelling to support this permit the more stringent critical level has been used throughout. However, in the ecological interpretation presented below the appropriateness of the lower critical level has been reviewed based on the habitat present in the affected area.

5.3.2 Critical loads for nitrogen and acid deposition vary from habitat to habitat. Reference has been made to the UK APIS and its Site Relevant Critical Load app for the SSSIs mentioned below. This has been combined with knowledge about the distribution of habitats on the site and how their function and/or use by qualifying species may be affected by pollution, a level of detail that isn't contained on APIS which is not tailored to specific designated sites. The appropriate critical load has been discussed below.

E2 – Minsmere-Walberswick Heaths & Marshes SSSI

5.3.3 As identified in Section 4, the SSSI is designated for a wide range of habitats and bird assemblages. By area, much of the SSSI particularly within c. 2.5km of the SZC site, consists of 'fen, marsh and swamp' which in this case does not support a diverse lichen or bryophyte flora. For these areas a critical level of 3 μgm^{-3} is more appropriate. However, the SSSI also supports areas of sand dune, coastal vegetated shingle, heathland and acid grassland (the latter two habitats particularly in its northern sections) most of which can support a diverse lichen flora. In particular, the section of SSSI closest to the SZC site includes an area of SD12 sand dune along the coastal strip, confirmed by habitat surveys for the SZC Development Consent Order (DCO), and areas of coastal vegetated shingle (as confirmed by RSPB/Suffolk Wildlife Trust submissions to the SZC DCO Examination[8]) which are both designated features of the SSSI.

[8] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010012/EN010012-005529-DL3 - Royal Society for the Protection of Birds RSPB and Suffolk Wildlife Trust Comments on Other D2.pdf#page=18

5.3.4 As discussed above, a large part of the SSSI is fen, marsh and swamp with a relatively high nitrogen critical load of 15 kgN/ha/yr. However, acid grassland, coastal vegetated shingle, sand dune and heathland all have a low critical load of 5kgN/ha/yr (as of spring 2023 when numerous critical loads were lowered across Europe based on a review of the latest evidence). The MAGIC website (www.magic.gov.uk) shows an area of heathland at 'The Grove' close to the SZC site. However, the recent (2023) Natural England SSSI condition assessment for the relevant Management Unit (MU 55) states '*No substantial heath was found in this unit. This unit largely consists of U20 acid grassland comprised of red fescue and common bent with high coverage of young bracken… Historic extent of heathland in this unit is unclear and previous condition assessments of the lowland dry heath (2015, 2009, 2002) all record a predominantly acid grassland and bracken unit with no substantial heathland*'. Nonetheless, acid grassland is a SSSI interest feature in its own right.

E4 – Leiston-Aldeburgh SSSI (Northern section)

5.3.5 The northern part of the SSSI, that closest to the SZC site, contains large areas of heathland and acid grassland, which are SSSI interest features in their own right and support breeding nightjar and woodlark. These habitats have a nitrogen critical load of 5kgN/ha/yr. While heathland and acid grassland can support a diverse lichen/bryophyte flora, their ability to do so does not affect the ability of either habitat to support nightjar or woodlark. However, since the SSSI is designated for acid grassland and heathland in themselves, the appropriate ammonia critical level is 1 μgm^{-3}.

E5 – Sizewell Marshes SSSI

5.3.6 Sizewell Marshes SSSI is designated for its fen, marsh and swamp habitats, particularly its rush pasture and fen meadow. From reference to APIS and knowledge of the site it is therefore considered that the nitrogen critical load for rich fens is most appropriate, this being 15 kgN/ha/yr. Fen, marsh and swamp in this area are not noted to have a significant lichen or bryophyte flora so the appropriate ammonia critical level for ecological interpretation is 3 μgm^{-3}.

E6 – Leiston-Aldeburgh SSSI (Southern section)

5.3.7 The southern part of the SSSI consists mainly of wetlands and reedbeds, running down the coast to Aldeburgh. As such the critical load for rich fen (15 kgN/ha/yr) is considered appropriate. For ammonia it is considered that the appropriate critical level for ecological interpretation of impacts on the SSSI is 3 μgm^{-3} as the wetland parts of the SSSI are not noted to support a diverse lichen or bryophyte flora.

5.3.8 The remainder of this section discusses the air quality modelling results. It is organised by modelled scenario, then by SSSI. Each pollutant is discussed in turn.

5.4 Modelled outcome: Scenario 1A 2024

Receptor E2: Minsmere-Walberswick Heaths & Marshes SSSI

NOx

5.4.1 The total (in combination) PC is forecast to be considerably more than 1% of the critical level for annual NOx and more than 10% of the critical level for short-term (24hr) NOx, being 14.5% and 31.1% of the critical level respectively. However, the critical level itself is not forecast to exceeded by the PEC for either annual or short-term NOx even when all sources of NOx are modelled 'in combination' (i.e. not just the generators for which a permit is being sought but including other sources such as road traffic and non-road mobile machinery). For annual NOx the PEC is forecast to be 37% of the critical level while for short-term NOx it is forecast to be 40.1% of the critical level.

5.4.2 Since the critical level will not be exceeded even 'in combination', potentially harmful levels of pollution will not be reached and no likely significant effect will arise from NOx in atmosphere, despite the fact that the 'in combination' PC will exceed 1% (or 10% for short-term NOx) of the critical level.

SO_2

5.4.3 The 'in combination' total PC will exceed 1% of the critical level being 1.8% of the critical level. However, the critical level for sulphur dioxide is not forecast to be exceeded by the PEC even when all sources of sulphur dioxide are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 21.6% of the critical level.

5.4.4 Since the critical level will not be exceeded, even 'in combination', potentially harmful levels of pollution will not be reached and no likely significant effect will arise from sulphur dioxide in atmosphere, despite the fact that the PC will exceed 1% of the critical level.

Ammonia

5.4.5 In the location of the nearest SSSI habitat, the vegetated fixed sand dunes immediately north of the SZC site, isopleths show that the PC for ammonia from the generators alone will exceed 0.05 μgm^{-3} (5% of the critical level for these habitats). When all sources are considered 'in combination' the 1% of the critical level threshold (0.01 μgm^{-3}) will be exceeded by the PC over approximately 57.5ha or 2.5% of the SSSI, although it should be noted that habitats for which this critical level applies (notably acid grassland, heathland and vegetated sand dunes) are only found in certain locations in the SSSI. The main areas of acid grassland and heathland are approximately 3.6km north of the SZC site, where isopleths indicate that the 'in combination' PC would be well below 1% of the critical level. Therefore, most areas of the most sensitive habitats in the SSSI by area will be affected to an imperceptible degree due to the activities for which this permit is being sought. However, areas of vegetated sand dune and vegetated shingle in the southern part of the SSSI would be subject to a PC exceeding 1% of the critical level.

5.4.6 For the fen, marsh and swamp habitat that constitutes the majority of the SSSI by area within c. 2.5km of the SZC site, the critical level is higher (3 μgm^{-3}) and will not be exceeded by the PEC even when all sources of ammonia are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 1.34 μgm^{-3}, 44.7% of this higher critical level. This is despite the fact the 'in combination' PC at the closest area of marsh is 0.05 μgm^{-3} and thus will slightly exceed the 1% of the critical level threshold for this habitat.

5.4.7 Therefore, no likely significant effect will arise on the fen, marsh and swamp areas of the SSSI, which constitutes most of the site within 2.5km of the SZC site, or the main areas of acid grassland and heathland, or the species that use those habitats because even 'in combination' potentially harmful levels of pollution will not be reached. **However, likely significant effects on vegetated sand dune and some vegetated shingle in the SSSI cannot be dismissed and some of these habitats are adjacent to the SZC site**.

Nitrogen

5.4.8 In the location of the nearest SSSI habitat, the vegetated fixed sand dunes immediately north of the SZC site, isopleths show that the PC for nitrogen from the generators alone will exceed 0.5kgN/ha/yr (10% of the critical load). The 1% of the critical level threshold (0.05 kgN/ha/yr) will be exceeded over approximately 150ha or 6.5% of the SSSI. Most of the acid grassland and heathland in the SSSI lies 3.6km from the SZC site and therefore well outside the 1% of the critical level threshold for the generators alone. There are only a few areas of acid grassland that would be subject to nitrogen deposition which exceeds 0.05 kgN/ha/yr (1% of the critical load) due to the generators alone. Therefore, most areas of the most sensitive habitats in the SSSI by area will be affected to an imperceptible degree due to the activities for which this permit is being sought. However, the affected area will include approximately 6ha of acid

grassland (dispersed across the SSSI) and approximately 30ha of sand dune and some areas of coastal vegetated shingle.

5.4.9 For the fen, marsh and swamp habitat that constitutes the majority of the SSSI by area within 2.5km of the SZC site the critical load is higher (15 kgN/ha/yr) and will not be exceeded by the PEC even when all sources of nitrogen are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 13.06 kgN/ha/yr or 87% of the critical load. Therefore, although the maximum 'in combination' PC at the nearest marsh is 0.5 kgN/ha/yr and thus well above the 1% of the critical level threshold, no likely significant effect will arise on these habitats or the species they support.

5.4.10 Therefore, no likely significant effect will arise on the fen, marsh and swamp areas on the SSSI, which constitutes most of the site, or the species that use those habitats, because even 'in combination' potentially harmful levels of pollution will not be reached. **However, likely significant effects on areas of vegetated sand dune, vegetated shingle, and acid grassland in the SSSI cannot be dismissed**.

Receptor E4: Leiston-Aldeburgh SSSI (Northern section)

NOx

5.4.11 The total (in combination) PC is forecast to be slightly over 1% of the critical level for annual NOx but less than 10% of the critical level (24hr NOx), being 1.5% and 4.0% of the critical level respectively. However, the critical level is not forecast to be exceeded by the PEC for either annual or short-term NOx even when all sources of NOx are modelled 'in combination' (i.e. not just the generators). For annual NOx the PEC is forecast to be 24% of the critical level while for short-term NOx it is forecast to be 13.1% of the critical level.

5.4.12 Since the critical level will not be exceeded even 'in combination', potentially harmful levels of pollution will not be reached and no likely significant effect will arise from NOx in atmosphere, notwithstanding the fact the PC for NOx will slightly exceed 1% of the annual critical level.

SO_2

5.4.13 The critical level for sulphur dioxide is not forecast to be exceeded by the PEC even when all sources of sulphur dioxide are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 13.7% of the critical level. Moreover, the 'in combination' total PC is well below 1% of the critical level being 0.2% of the critical level.

5.4.14 Since the critical level will not be exceeded even 'in combination', potentially harmful levels of pollution will not be reached and the 'in combination' PC will not exceed 1% of the critical level, no likely significant effect will arise.

Ammonia

5.4.15 The 1 μgm^{-3} critical level for acid grassland and heathland will be exceeded with the PEC being 138.4% of the critical level at the closest part of the SSSI, where the heathland and acid grassland is concentrated. Moreover, the 'in combination' PC will be 3.9% of the critical level, although the contribution of the generators alone would only exceed 1% of the critical level over the northern-most 3.7ha or 0.7% of the SSSI, of which 2.5ha is heathland with the remainder being roadside woodland.

5.4.16 Since the critical level will be exceeded and the 'in combination' PC would exceed 1% of the critical level, likely significant effects on the SSSI cannot be dismissed.

Nitrogen

5.4.17 The critical load for acid grassland and heathland (5 kgN/ha/yr) will be exceeded with the PEC being 12.66 kgN/ha/yr or 253.3% of the critical load at the closest part of the SSSI. This northern part of the SSSI is one of the main locations of heathland and acid grassland in the site. The in combination PC will be 4.9% of the

critical load. Only a small part of the SSSI would be subject to nitrogen deposition above 1% of the critical load due to generators alone, but this nonetheless amounts to 9ha of heathland and acid grassland.

5.4.18 Since the critical load will be exceeded and the 'in combination' PC would exceed 1% of the critical load, likely significant effects on the SSSI cannot be dismissed.

Receptor E5: Sizewell Marshes SSSI

NOx

5.4.19 The critical level for NOx is not forecast to exceeded by the PEC for either annual or short-term NOx even when all sources of NOx are modelled 'in combination' (i.e. not just the generators). For annual NOx the PEC is forecast to be 27.2% of the critical level while for short-term NOx it is forecast to be 25.4% of the critical level. The total (in combination) PC is forecast to be more than 1% of the critical level for annual NOx and more than 10% of the critical level (24hr NOx), being 5.2% and 16.6% of the critical level respectively.

5.4.20 However, since the critical level will not be exceeded even 'in combination' potentially harmful levels of pollution will not be reached, and no likely significant effect will arise notwithstanding the fact the PC exceeds 1% (and 10% for short-term NOx) of the critical level.

SO_2

5.4.21 The critical level for sulphur dioxide is not forecast to be exceeded by the PEC even when all sources of sulphur dioxide are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 14.6% of the critical level. The 'in combination' total PC is not forecast to exceed 1% of the critical level.

5.4.22 Since the critical level will not be exceeded even 'in combination' potentially harmful levels of pollution will not be reached, and no likely significant effect will arise.

Ammonia

5.4.23 Using a critical level of 3 μgm^{-3} appropriate for fen, marsh and swamp, the critical level is not forecast to be exceeded by the PEC even when all sources of ammonia are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 50% of the critical level (1.50 μgm^{-3}). The 'in combination' total PC exceeds 1% of the critical level being 0.14 μgm^{-3} or 4.7% of the critical level.

5.4.24 However, since the critical level will not be exceeded even 'in combination' potentially harmful levels of pollution will not be reached, and no likely significant effect will arise notwithstanding the PC exceeding 1% of the critical level.

5.4.25 Nitrogen

5.4.26 The critical load for fen, marsh and swamp (15 kgN/ha/yr) is not forecast to be exceeded by the PEC even when all sources of nitrogen are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 90.7% of the critical load. The 'in combination' total PC is above 1% of the critical load being 4.6% of the critical load.

5.4.27 However, since the critical load will not be exceeded even 'in combination' potentially harmful levels of pollution will not be reached, and no likely significant effect will arise notwithstanding the PC exceeding 1% of the critical load.

Receptor E6: Leiston to Aldeburgh SSSI (Southern section)

NOx

5.4.28 The critical level for NOx is not forecast to exceeded by the PEC for either annual or short-term NOx even when all sources of NOx are modelled 'in combination' (i.e. not just the generators). For annual NOx the PEC is forecast to be 24.1% of the critical level while for short-term NOx it is forecast to be 14% of the critical level. Moreover, the total (in combination) PC is forecast to be approximately 1% of the critical level for annual NOx and less than 10% of the critical level (24hr NOx), being 1.5% and 5.1% of the critical level respectively.

5.4.29 Since the critical level will not be exceeded even 'in combination', and the PC does not exceed 1% (and 10% for short-term NOx) of the critical level, no likely significant effect will arise.

SO_2

5.4.30 The critical level for sulphur dioxide is not forecast to be exceeded by the PEC even when all sources of sulphur dioxide are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 13.7% of the critical level. The 'in combination' total PC is also well below 1% of the critical level being 0.2% of the critical level.

5.4.31 Since the critical level will not be exceeded even 'in combination', and the PC does not exceed 1% of the critical level, no likely significant effect will arise.

Ammonia

5.4.32 Using a critical level of 3 μgm^{-3} appropriate for fen, marsh and swamp, the critical level is not forecast to be exceeded by the PEC even when all sources of ammonia are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 46% of the critical level (1.38μgm^{-3}). The 'in combination' total slightly exceeds 1% of the critical level being 0.04 μgm^{-3} or 1.3% of the critical level.

5.4.33 However, since the critical level will not be exceeded even 'in combination' no likely significant effect will arise notwithstanding the PC exceeding 1% of the critical level.

Nitrogen

5.4.34 The critical load for fen, marsh and swamp (15 kgN/ha/yr) is not forecast to be exceeded by the PEC even when all sources of nitrogen are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 83.9% of the critical load. The 'in combination' total PC is above 1% of the critical load being 1.6% of the critical load at the closest part of the SSSI.

5.4.35 Since the critical load will not be exceeded even 'in combination', no likely significant effect will arise even though the PC exceeds 1% of the critical load.

5.5 Modelled outcome: Scenario 1A 2025

Receptor E2: Minsmere-Walberswick Heaths & Marshes SSSI

Annual NOx

5.5.1 The total (in combination) PC is forecast to be more than 1% of the critical level for annual NOx, being 31.1% of the critical level. However, the critical level is not forecast to be exceeded by the PEC for annual NOx even when all sources of NOx are modelled 'in combination' (i.e. not just the generators).

5.5.2 Since the critical level will not be exceeded even 'in combination' potentially harmful levels of pollution will not be reached and no likely significant effect will arise, despite the fact that the PC will exceed 1% of the critical level.

Short-term NOx

5.5.3 The total (in combination) PC is forecast to be more than 10% of the critical level for annual NOx, being 46.9% of the critical level. However, the critical level is not forecast to be exceeded by the PEC for short-term NOx even when all sources of NOx are modelled 'in combination' (i.e. not just the generators).

5.5.4 Since the critical level will not be exceeded even 'in combination' potentially harmful levels of pollution will not be reached and no likely significant effect will arise, despite the fact that the PC will exceed 10% of the critical level.

SO_2

5.5.5 The 'in combination' total PC will exceed 1% of the critical level being 2.5% of the critical level. However, the critical level for sulphur dioxide is not forecast to be exceeded by the PEC even when all sources of sulphur dioxide are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 22.3% of the critical level.

5.5.6 Since the critical level will not be exceeded even 'in combination' potentially harmful levels of pollution will not be reached and no likely significant effect will arise, despite the fact that the 'in combination' PC will exceed 1% of the critical level.

Ammonia

5.5.7 In the location of the nearest SSSI habitat, the vegetated fixed sand dunes immediately north of the SZC site, isopleths show that the PC for ammonia from the generators alone will exceed 0.07 μgm^{-3} (7% of the critical level for these habitats). When all sources are considered 'in combination' the 1% of the critical level threshold (0.01 μgm^{-3}) will be exceeded over 209ha or 9% of the SSSI. The main areas of the most sensitive habitats (acid grassland and heathland in particular) are located 3.6km to the north of the SZC site and according to isopleths would therefore be subject to an 'in combination' ammonia PC well below 1% of the critical level. However, areas of vegetated sand dune and vegetated shingle in the southern part of the SSSI would be subject to a PC exceeding 1% of the critical level.

5.5.8 For the fen, marsh and swamp habitat that constitutes the majority of the SSSI by area within c. 2.5km of the SZC site, the critical level is higher (3 μgm^{-3}) and will not be exceeded by the PEC even when all sources of ammonia are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 1.39 μgm^{-3}, 46% of this higher critical level. This is despite the fact the PC from generators alone at the closest area of marsh is 0.09 μgm^{-3} and thus will exceed the 1% of the critical level threshold for this habitat.

5.5.9 Therefore, no likely significant effect will arise on the fen, marsh and swamp areas on the SSSI, or the main areas of acid grassland or heathland, or the species that use those habitats as potentially harmful levels of pollution will not be reached. **However, likely significant effects on the areas sand dune and coastal vegetated shingle in the SSSI cannot be dismissed**.

Nitrogen

5.5.10 In the location of the nearest SSSI habitat, vegetated sand dunes immediately north of the SZC site, and areas of coastal vegetated shingle c. 100m away, isopleths show that the PC for nitrogen from the generators alone will exceed 1kgN/ha/yr (20% of the critical load). The 1% of the critical level threshold (0.05 μgm^{-3}) will be exceeded over approximately 560ha or 24% of the SSSI. This includes approximately 93ha of heathland in the SSSI. This heathland will be subject to deposition due to the generators alone of 0.05 to 0.1 kgN/ha/yr (10-20% of the critical load).

5.5.11 For the fen, marsh and swamp habitat that constitutes the majority of the SSSI by area within 2.5km of the SZC site the critical load is higher (15 kgN/ha/yr) and will not be exceeded by the PEC even when all sources of nitrogen are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 13.79 kgN/ha/yr or 92% of the critical load. Therefore, although the maximum 'in combination' PC at the nearest marsh is approximately 1 kgN/ha/yr and thus well above the 1% of the critical load threshold, no likely significant effect will arise on these habitats or the species they support.

5.5.12 Therefore, no likely significant effect will arise on the fen, marsh and swamp areas on the SSSI, or the species that use those habitats as potentially harmful levels of pollution will not be reached. **However, likely significant effects on the areas of heathland, acid grassland sand dune and vegetated shingle in the SSSI cannot be dismissed**.

Receptor E4: Leiston-Aldeburgh SSSI (Northern section)

NOx

5.5.13 The critical level is not forecast to be exceeded by the PEC for either annual or short-term NOx even when all sources of NOx are modelled 'in combination' (i.e. not just the generators). For annual NOx the PEC is forecast to be 25.2% of the critical level while for short-term NOx it is forecast to be 17.2% of the critical level. The total (in combination) PC is forecast to be over 1% of the critical level for annual NOx but below 10% of the critical level for 24hr NOx, being 2.6% and 8.2% of the critical level respectively.

5.5.14 Since the critical level will not be exceeded even 'in combination', potentially harmful levels of pollution will not be reached and no likely significant effect will arise, notwithstanding the fact the PC for NOx will slightly exceed 1% (or 10% for daily NOx) of the critical level.

SO_2

5.5.15 The critical level for sulphur dioxide is not forecast to be exceeded by the PEC even when all sources of sulphur dioxide are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 13.7% of the critical level. Moreover, the 'in combination' total PC is well below 1% of the critical level being 0.2% of the critical level.

5.5.16 Since the critical level will not be exceeded even 'in combination' and the PC will not exceed 1% of the critical level, no likely significant effect will arise.

Ammonia

5.5.17 The 1 μgm^{-3} critical level for acid grassland and heathland will be exceeded with the PEC being 137.6% of the critical level at the closest part of the SSSI, where the heathland and grassland is concentrated. Moreover, the 'in combination' PC will be 3.1% of the critical level However, none of this will be due to the generators (for which the permit is being sought) as the contribution of the generators at the closest part of the SSSI is 0.00 μgm^{-3} (i.e. too small to show in the model at two decimal places).

5.5.18 Although the 'in combination' PC would exceed 1% of the critical level, the generators will make an imperceptible contribution to this and likely significant effects on the SSSI can therefore be dismissed.

Nitrogen

5.5.19 The critical load for acid grassland and heathland (5 kgN/ha/yr) will be exceeded with the PEC being 253.1% of the critical load at the closest part of the SSSI. Moreover, the 'in combination' PC will be 4.7% of the critical load. This northern part of the SSSI is one of the main locations of heathland and acid grassland in the site. Approximately 36ha of the site (7% of the SSSI) would be subject to nitrogen deposition above 1% of the critical load due to the generators alone, much of which is heathland.

5.5.20 Since the critical load will be exceeded and the 'in combination' PC would exceed 1% of the critical load, likely significant effects on the heathlands of the SSSI cannot be dismissed.

Receptor E5: Sizewell Marshes SSSI

NOx

5.5.21 The critical level for NOx is not forecast to exceeded by the PEC for either annual or short-term NOx even when all sources of NOx are modelled 'in combination' (i.e. not just the generators). For annual NOx the PEC is forecast to be 34.2% of the critical level while for short-term NOx it is forecast to be 35.5% of the critical level. The total (in combination) PC is forecast to be more than 1% of the critical level for annual NOx and more than 10% of the critical level (24hr NOx), being 12.1% and 26.6% of the critical level respectively.

5.5.22 Since the critical level will not be exceeded even 'in combination' potentially harmful levels of pollution will not be reached, and no likely significant effect will arise notwithstanding the fact the PC exceeds 1% (and 10% for short-term NOx) of the critical level.

SO_2

5.5.23 The critical level for sulphur dioxide is not forecast to be exceeded by the PEC even when all sources of sulphur dioxide are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 14.7% of the critical level. The 'in combination' total PC is slightly over 1% of the critical level being 1.1% of the critical level.

5.5.24 Since the critical level will not be exceeded even 'in combination' potentially harmful levels of pollution will not be reached, and no likely significant effect will arise notwithstanding the fact the PC exceeds 1% of the critical level.

Ammonia

5.5.25 Using a critical level of 3 μgm^{-3} appropriate for fen, marsh and swamp, the critical level is not forecast to be exceeded by the PEC even when all sources of ammonia are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 50% of the critical level (1.50 μgm^{-3}). The 'in combination' total PC exceeds 1% of the critical level being 0.15 μgm^{-3} or 4.5% of the critical level.

5.5.26 However, since the critical level will not be exceeded even 'in combination' potentially harmful levels of pollution will not be reached, and no likely significant effect will arise notwithstanding the PC exceeding 1% of the critical level.

Nitrogen

5.5.27 The critical load for fen, marsh and swamp (15 kgN/ha/yr) is not forecast to be exceeded by the PEC even when all sources of nitrogen are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 88.7% of the critical load. The 'in combination' total PC is above 1% of the critical level being 4% of the critical load.

5.5.28 However, since the critical load will not be exceeded even 'in combination' potentially harmful levels of pollution will not be reached, and no likely significant effect will arise notwithstanding the PC exceeding 1% of the critical load.

Receptor E6: Leiston to Aldeburgh SSSI (Southern section)

NOx

5.5.29 The critical level for NOx is not forecast to exceeded by the PEC for either annual or short-term NOx even when all sources of NOx are modelled 'in combination' (i.e. not just the generators). For annual NOx the PEC is forecast to be 17.7% of the critical level while for short-term NOx it is forecast to be 14% of the critical level. The total (in combination) PC is forecast to exceed 1% of the critical level for annual NOx but be below 10% of the critical level (24hr NOx), being 1.9% and 8.7% of the critical level respectively.

5.5.30 Since the critical level will not be exceeded even 'in combination', potentially harmful levels of pollution will not be reached, and no likely significant effect will arise notwithstanding that the PC exceeds 1% of the annual critical level.

SO_2

5.5.31 The critical level for sulphur dioxide is not forecast to be exceeded by the PEC even when all sources of sulphur dioxide are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 15.8% of the critical level. The 'in combination' total PC is also well below 1% of the critical level being 0.2% of the critical level.

5.5.32 Since the critical level will not be exceeded even 'in combination', and the PC does not exceed 1% of the critical level, no likely significant effect will arise.

Ammonia

5.5.33 Using a critical level of 3 μgm^{-3} appropriate for fen, marsh and swamp, the critical level is not forecast to be exceeded by the PEC even when all sources of ammonia are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 43% of the critical level (1.30 μgm^{-3}). The 'in combination' total does not exceed 1% of the critical level being 0.03 μgm^{-3} or 1% of the critical level.

5.5.34 Since the critical level will not be exceeded even 'in combination' and the PC will not exceed 1% of the critical level potentially harmful levels of pollution will not be reached and no likely significant effect will arise.

Nitrogen

5.5.35 The critical load for fen, marsh and swamp (15 kgN/ha/yr) is not forecast to be exceeded by the PEC even when all sources of nitrogen are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 84.4% of the critical load. The 'in combination' total PC slightly exceeds 1% of the critical load being 1.6% of the critical load at the closest part of the SSSI.

5.5.36 Since the critical load will not be exceeded even 'in combination', no likely significant effect will arise Despite the fact the PC slightly exceeds 1% of the critical load.

5.6 Modelled outcome: Scenario 2E

Receptor E2: Minsmere-Walberswick Heaths & Marshes SSSI

NOx

5.6.1 The total (in combination) PC is forecast to be more than 1% of the critical level for annual NOx, and 10% of the critical level for short-term (24hr) NOx, being 21.3% and 30.9% of the critical level respectively. However, the critical level is not forecast to exceeded by the PEC for either annual NOx or short-term (24hr) NOx even when all sources of NOx are modelled 'in combination' (i.e. not just the generators), being 43.8% and 39.9% of the critical level respectively.

5.6.2 Since the critical level will not be exceeded even 'in combination' potentially harmful levels of pollution will not be reached and no likely significant effect will arise, despite the fact that the 'in combination' PC will exceed 1% of the critical level.

SO_2

5.6.3 The 'in combination' total PC will exceed 1% of the critical level being 11.5% of the critical level. However, the critical level for sulphur dioxide is not forecast to be exceeded by the PEC even when all sources of sulphur dioxide are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 31.3% of the critical level.

5.6.4 Since the critical level will not be exceeded even 'in combination' potentially harmful levels of pollution will not be reached and no likely significant effect will arise, despite the fact that the PC will exceed 1% of the critical level.

Ammonia

5.6.5 In the location of the nearest SSSI habitat, the vegetated sand dunes immediately north of the SZC site, isopleths show that the PC for ammonia from the generators alone will exceed 0.25 μgm^{-3} (25% of the critical level for these habitats). When all sources are considered in combination, the 1% of the critical level threshold (0.01 μgm^{-3}) will be exceeded over approximately 568ha (25%) of the SSSI. The main areas of the most sensitive habitats (acid grassland and heathland in particular) are located 3.6km north of the SZC site. At these locations the PC for ammonia from the generators alone will be approximately 0.01 to 0.02 μgm^{-3} (i.e. 1% to 2% of the critical level).

5.6.6 For the fen, marsh and swamp habitat that constitutes the majority of the SSSI by area within 2.5km of the SZC site the critical level is higher (3 μgm^{-3}) and will not be exceeded by the PEC even when all sources of ammonia are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 1.57 μgm^{-3}, 52% of this higher critical level. This is despite the fact the PC from the generators alone at the closest area of marsh is 0.23 μgm^{-3} and thus will exceed the 1% of the critical level threshold for this habitat.

5.6.7 Therefore, no likely significant effect will arise on the fen, marsh and swamp areas on the SSSI, or the species that use those habitats because potentially harmful levels of pollution will not be reached. **However, likely significant effects on the areas of acid grassland, heathland, sand dune and vegetated shingle in the SSSI cannot be dismissed, and some of these are adjacent to the SZC site**.

Nitrogen

5.6.8 In the location of the nearest SSSI habitat, the vegetated sand dunes immediately north of the SZC site, isopleths show that the PC for nitrogen from the generators alone will exceed 1kgN/ha/yr (20% of the critical load). When all sources are considered 'in combination', the 1% of the critical level threshold (0.05 kgN/ha/yr) will be exceeded over 900ha (39%) of the SSSI including areas of heathland, acid grassland, coastal vegetated shingle and vegetated dune.

5.6.9 For the fen, marsh and swamp habitat that constitutes the majority of the SSSI by area within 2.5km of the SZC site, the critical load is higher (15 kgN/ha/yr) and will be exceeded by the PEC when all sources of nitrogen are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 100% of the critical load. Moreover, the maximum 'in combination' PC at the nearest marsh is 2.72 kgN/ha/yr and thus well above the 1% of the critical load threshold.

5.6.10 Therefore, likely significant effects cannot be dismissed on the fen, marsh and swamp areas on the SSSI, or the species that use those habitats, or on the areas of acid grassland, heathland, sand dune and vegetated shingle in the SSSI Some of these habitats are adjacent to the SZC site.

Receptor E4: Leiston-Aldeburgh SSSI (Northern section)

NOx

5.6.11 The critical level is not forecast to be exceeded by the PEC for either annual or short-term NOx even when all sources of NOx are modelled 'in combination' (i.e. not just the generators). For annual NOx the PEC is forecast to be 24.0% of the critical level while for short-term NOx it is forecast to be 12.3% of the critical level. The total (in combination) PC is forecast to be slightly over 1% of the critical level for annual NOx but below 10% of the critical level for 24hr NOx, being 1.3% and 3.2% of the critical level respectively.

5.6.12 Since the critical level will not be exceeded even 'in combination', potentially harmful levels of pollution will not be reached and no likely significant effect will arise, notwithstanding the fact the annual PC for NOx will slightly exceed 1% of the critical level.

SO_2

5.6.13 The critical level for sulphur dioxide is not forecast to be exceeded by the PEC even when all sources of sulphur dioxide are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 14.2% of the critical level. The 'in combination' total PC is 0.7 μgm^{-3} and thus below 1% of the critical level.

5.6.14 Since the critical level will not be exceeded even 'in combination', and the PC will not exceed 1% of the critical level, potentially harmful levels of pollution will not be reached, and no likely significant effect will arise.

Ammonia

5.6.15 The 1 μgm^{-3} critical level for acid grassland and heathland will be exceeded with the PEC being 136.1% of the critical level at the closest part of the SSSI. Moreover, the 'in combination' PC will be 1.6% of the critical level at the closest area of these habitats. According to isopleths the 1% of the critical level contour will be exceeded by the generators PC alone over 10.5ha (2%) of the SSSI, most of which is heathland or acid grassland.

5.6.16 Since the critical level will be exceeded and the 'in combination' PC would exceed 1% of the critical level, likely significant effects on the SSSI cannot be dismissed.

Nitrogen

5.6.17 The critical load for acid grassland and heathland (5 kgN/ha/yr) will be exceeded with the PEC being 250.9% of the critical load at the closest part of the SSSI. Moreover, the 'in combination' PC will be 2.5% of the critical load, of which most will derive from the generators. This northern part of the SSSI is one of the main locations of heathland and acid grassland in the site. Approximately 65ha (12%) of the SSSI will be subject to nitrogen deposition above 1% of the critical load due to the generators alone, and most of this habitat is heathland or acid grassland.

5.6.18 Since the critical load will be exceeded and the 'in combination' PC would exceed 1% of the critical load, likely significant effects on the SSSI cannot be dismissed.

Receptor E5: Sizewell Marshes SSSI

NOx

5.6.19 The critical level for NOx is not forecast to be exceeded by the PEC for either annual or short-term NOx even when all sources of NOx are modelled 'in combination' (i.e. not just the generators). For annual NOx the PEC is forecast to be 33.1% of the critical level while for short-term NOx it is forecast to be 28.2% of the critical level. The total (in combination) PC is forecast to be more than 1% of the critical level for annual

NOx and more than 10% of the critical level (24hr NOx), being 11.1% and 19.3% of the critical level respectively.

5.6.20 However, since the critical level will not be exceeded even 'in combination' potentially harmful levels of pollution will not be reached, and no likely significant effect will arise notwithstanding the fact the PC exceeds 1% (and 10% for short-term NOx) of the critical level.

SO_2

5.6.21 The critical level for sulphur dioxide is not forecast to be exceeded by the PEC even when all sources of sulphur dioxide are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 19.8% of the critical level. The 'in combination' total PC is over 1% of the critical level being 6.1% of the critical level.

5.6.22 However, since the critical level will not be exceeded even 'in combination' potentially harmful levels of pollution will not be reached, and no likely significant effect will arise notwithstanding the fact the PC exceeds 1% of the critical level.

5.6.23 Ammonia

5.6.24 Using a critical level of 3 μgm^{-3} appropriate for fen, marsh and swamp, the critical level is not forecast to be exceeded by the PEC even when all sources of ammonia are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 50.3% of the critical level (1.51 μgm^{-3}). The 'in combination' total PC exceeds 1% of the critical level being 0.15 μgm^{-3} or 5% of the critical level.

5.6.25 However, since the critical level will not be exceeded even 'in combination' potentially harmful levels of pollution will not be reached, and no likely significant effect will arise notwithstanding the PC exceeding 1% of the critical level.

Nitrogen

5.6.26 The critical load for fen, marsh and swamp (15 kgN/ha/yr) is not forecast to be exceeded by the PEC even when all sources of nitrogen are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 92.4% of the critical load. The 'in combination' total PC is above 1% of the critical load being 7.6% of the critical load.

5.6.27 However, since the critical load will not be exceeded even 'in combination' potentially harmful levels of pollution will not be reached, and no likely significant effect will arise notwithstanding the PC exceeding 1% of the critical load.

Receptor E6: Leiston to Aldeburgh SSSI (Southern section)

NOx

5.6.28 The critical level for NOx is not forecast to exceeded by the PEC for either annual or short-term NOx even when all sources of NOx are modelled 'in combination' (i.e. not just the generators). For annual NOx the PEC is forecast to be 23.7% of the critical level while for short-term NOx it is forecast to be 12.3% of the critical level. The total (in combination) PC is forecast to exceed 1% of the critical level for annual NOx but will be below 10% of the critical level (24hr NOx), being 1.1% and 3.3% of the critical level respectively.

5.6.29 Since the critical level will not be exceeded even 'in combination', potentially harmful levels of pollution will not be reached, and no likely significant effect will arise notwithstanding that the annual PC exceeds 1% of the critical level.

SO_2

5.6.30 The critical level for sulphur dioxide is not forecast to be exceeded by the PEC even when all sources of sulphur dioxide are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 14.2% of the critical level. The 'in combination' total PC is below 1% of the critical level being 0.7% of the critical level.

5.6.31 Since the critical level will not be exceeded even 'in combination', potentially harmful levels of pollution will not be reached, and no likely significant effect will arise notwithstanding that the PC exceeds 1% of the critical level.

Ammonia

5.6.32 Using a critical level of 3 μgm^{-3} appropriate for fen, marsh and swamp, the critical level is not forecast to be exceeded by the PEC even when all sources of ammonia are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 45.3% of the critical level (1.36 μgm^{-3}). The 'in combination' total does not exceed 1% of the critical level being 0.02 μgm^{-3} or 0.7% of the critical level.

5.6.33 Since the critical level will not be exceeded even 'in combination' and the PC does not exceed 1% of the critical level, no likely significant effect will arise.

Nitrogen

5.6.34 The critical load for fen, marsh and swamp (15 kgN/ha/yr) is not forecast to be exceeded by the PEC even when all sources of nitrogen are modelled 'in combination' (i.e. not just the generators), with the PEC forecast to be 12.55 kgN/ha/yr or 83.6% of the critical load. The 'in combination' total PC is slightly below 1% of the critical load being 0.9% of the critical load at the closest part of the SSSI.

5.6.35 Since the critical load will not be exceeded even 'in combination', and the PC will not exceed 1% of the critical load, potentially harmful levels of pollution will not be reached, and no likely significant effect will arise.

6 ASSESSMENT CONCLUSIONS

6.1 Introduction

6.1.1 As set out in section 5 the following impacts which are greater than mathematically imperceptible have been identified:

Scenario 1A 2024

6.1.2 Minsmere to Walberswick Heaths and Marshes SSSI – Nitrogen deposition and ammonia PC above 1% of the critical load/level on some areas of acid grassland, and on areas of vegetated sand dune and vegetated shingle. Approximately 2.5% of the SSSI (for ammonia) and 6.5% of the SSSI (for nitrogen deposition) will be subject to an 'in combination' PC above 1% of the critical level or load, with the maximum PC from the generators alone being 5% of the critical level for ammonia and 10% of the critical load for nitrogen at the closest area of vegetated sand dune immediately north of the SZC site.

6.1.3 Leiston-Aldeburgh SSSI (Northern section) – Nitrogen deposition and ammonia PC above 1% of the critical load/level on areas of heathland. Approximately 9ha of heathland would be subject to nitrogen deposition exceeding 1% of the critical load, and approximately 2.5ha to ammonia exceeding 1% of the critical level, due to the generators alone.

Scenario 1A 2025

6.1.4 Minsmere to Walberswick Heaths and Marshes SSSI – Nitrogen deposition and ammonia PC above 1% of the critical load/level on some areas of acid grassland, and on areas of vegetated sand dune and vegetated shingle. Approximately 9% of the SSSI (for ammonia) and 24% of the SSSI (for nitrogen deposition) will be subject to an 'in combination' PC above 1% of the critical level or load, with the maximum PC from the generators alone being 7% of the critical level for ammonia and 20% of the critical load for nitrogen at the closest area of vegetated sand dune immediately north of the SZC site.

6.1.5 Leiston-Aldeburgh SSSI (Northern section) – Nitrogen deposition PC above 1% of the critical load/level on areas of heathland. Approximately 36ha of heathland would be subject to nitrogen deposition exceeding 1% of the critical load due to the generators alone.

Scenario 2E

6.1.6 Minsmere to Walberswick Heaths and Marshes SSSI – Nitrogen deposition and ammonia PC above 1% of the critical load/level on some areas of marsh, acid grassland, and vegetated sand dune and vegetated shingle. Approximately 25% of the SSSI (for ammonia) and 39% of the SSSI (for nitrogen deposition) will be subject to an 'in combination' PC above 1% of the critical level or load, with the maximum PC from the generators alone being 25% of the critical level for ammonia and 20% of the critical load for nitrogen at the closest area of vegetated sand dune immediately north of the SZC site.

6.1.7 Leiston-Aldeburgh SSSI (Northern section) – Nitrogen deposition and ammonia PC above 1% of the critical load/level on areas of heathland. Approximately 10.5ha of heathland would be subject to ammonia

exceeding 1% of the critical level, and approximately 65ha to nitrogen deposition exceeding 1% of the critical load, due to the generators alone.

6.2 Evidence for Ecological Effects of Ammonia and Nitrogen

6.2.1 The remainder of this section focusses on discussion of ammonia and nitrogen deposition effects on heathland, vegetated shingle, acid grassland, and sand dunes, these being the most sensitive habitats within the European sites. They can result in the following impacts (not an exhaustive list):

- These systems are adapted to low levels of mineral nitrogen availability: increasing the availability of nitrogen will threaten the competitive balance between species leading to changes in composition and loss of habitat species constants.
- Nitrogen deposition can speed up the succession through the chronosequence, advancing habitats between the dune stages.
- Lichens and mosses are particularly sensitive both from direct effects associated with ammonia and from shading as a consequence of increase growth of overstorey vegetation in response to nitrogen deposition.
- Disruption of the competitive balance between species leading to changes in composition and loss of habitat species constants.
- Increases in grass cover i.e. shift from heath with a high proportion of dwarf shrubs to acid grassland.
- Change in species composition due to eutrophication, and shading of the lower storey vegetation, mosses, lichens and forbs, by taller faster growing species e.g. graminoids and sometimes sedges.
- Increased pests and grazers as plant tissue becomes more palatable.
- Bleaching on sensitive species, usually occurs first on lichens.

6.2.2 Bobbink et al (2022)[9] notes that for dune grasslands there is now strong evidence from a wide range of studies including in situ nitrogen additions, experimental mesocosms under a range of exposure methods, gradient studies and analysis of untargeted surveys. There is new evidence, from multiple sources, of ecological changes in both calcareous and acidic dunes at the lower end of this range. In many Dutch dry dune grasslands, tall grasses have increased since the 1970's, a period of increased nitrogen deposition, particularly from agricultural sources. Because of reduced light penetration through the tall grass canopies formed by these species, the development of several prostrate species has been reduced and management is now necessary to maintain the diversity of these systems. In the past, tall graminoids were usually not dominant on these low nutrient sandy dune soils in the Netherlands. The report notes that dunes in Britain generally receive less nitrogen deposition, and this is correlated with a greater species richness and less dominance of tall grasses than in Dutch dunes.

6.2.3 A targeted survey in the coastal dune areas across England and Wales, in regions with much lower N deposition than in the Netherlands surveyed eleven coastal dune sites with atmospheric N deposition ranging from 10 to 30 kgN/ha/yr. In these stable dune grasslands, above-ground biomass was related positively to nitrogen deposition, while species richness showed a weak negative relationship. A separate UK study reported in the same research identified a reduction in the number of bryophyte species with

[9] Bobbink R, Loran C, Tomassen H. 2022. Review and Revision of Empirical Critical Loads of Nitrogen for Europe. Report for the German Environment Agency

increasing nitrogen deposition. The report notes that reduction in traditional grazing may also be a reason for reduced species richness and increased dominance of tall grasses.

6.2.4 For lowland heathland Bobbink et al (2022) states that despite the conservation and management efforts in nature reserves, many lowland heaths in western Europe have become dominated by grass species. By using aerial photographs, it was demonstrated that more than 35% of Dutch heaths developed into grasslands during the 1980s. It was suggested that a strong increase in atmospheric nitrogen deposition contributed to this transition towards grassland. Competition experiments in containers and in the field have clearly demonstrated an important effect of increased N availability on the competitive interactions between Calluna vulgaris and grasses in the early phase of secondary succession in dry lowland heath. Understory species, especially the typical and frequently occurring lichen and moss species, can be negatively affected by increased growth of vascular species due to (for example) increased shading.

6.2.5 Similar patterns were found in the UK over the past 20 to 50 years. However, the authors do note that changes in management practices (a move away from grazing, burning and sod cutting) may also be partly responsible for this shift to grass heath. The authors note that the intensity of management of Calluna heathlands may affect the impact of increased nitrogen such that more intense management would make the heathlands more resilient to nitrogen deposition thus raising its critical load. They therefore advocate a critical load of 15 kgN/ha/yr for heathlands with high intensity management.

6.3 Assessment of this permit

6.3.1 The forecast change in ammonia concentrations and nitrogen deposition rates due to the generators alone is equivalent to 10-20% of the critical load for nitrogen deposition (0.5 to 1 kgN/ha/yr) at sand dunes and vegetated shingle in Minsmere-Walberswick Heaths & Marshes SSSI). Based on the information in the previous section PCs of this magnitude could potentially cause detectable botanical effects **if this was a long-term or permanent nitrogen source**. Moreover, the physical extent of exposure is considerable, with nitrogen deposition from the generators affecting 6.5% to 39% of Minsmere to Walberswick Heaths & Marshes SSSI and 9ha to 65ha of heathland within Leiston-Aldeburgh SSSI (depending on scenario).

6.3.2 **However**, this must be balanced against three important factors:

- Firstly, the impacts discussed in this HRA Report are temporary, lasting a total of approximately three years (c. 2024/25 – 2027/28). They therefore will not affect long-term nitrogen deposition or ammonia concentrations which are most relevant for affecting habitats and species.
- Secondly, as reported in the DCO HRA[10] , for nitrogen deposition there is evidence that at high background deposition rates such as are currently experienced at both European sites the degree of botanical change in most parameters from incremental further additions of nitrogen is much smaller than at low background deposition rates.
- Thirdly, the impacts of the generators for this temporary period must be considered within the context of the longer term (effectively permanent) changes in the landscape being delivered by the Sizewell C project which is removing large areas of agricultural land (a major source of ammonia and nitrogen) from arable production.

[10] Such as paragraph 7.7.27 in Volume 5.10 the Shadow Habitats Regulations Assessment Volume 1 (https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010012/EN010012-001765-SZC_Bk5_5.10_V1_Shadow_HRA_Report_Part_1_of_5.pdf)

These are discussed in turn below.

Duration of impact

6.3.3 Critical levels are an annual average but once the source of pollution ceases it no longer contributes to concentrations in atmosphere. The critical load system for nitrogen deposition assumes decades of continuous exposure[11] . Over the short term an elevation in nitrogen deposition is unlikely to result in changes in vegetation communities over the temporary period the generators are proposed to be operational (up to three years) taking into account the considerable variation in background nitrogen deposition that is likely to occur normally over short time periods. For example the UK Air Pollution Information System reports that background nitrogen deposition to short vegetation for the closest part of Minsmere to Walberswick Heaths and Marshes SSSI between 2005 and 2010 varied annually by as much as 0.7 kgN/ha/yr, while ammonia concentrations fluctuated annually by up to 0.1 μgm^{-3}, equivalent to 40-50% of the worst-case nitrogen (1.6 kgN/ha/yr) and ammonia (0.2 μgm^{-3}) PC forecast from the generators to this SSSI.

6.3.4 Similarly, at the closest part of Leiston-Aldeburgh SSSI, APIS indicates nitrogen deposition to short vegetation between 2005 and 2010 fluctuated annually by up to 0.7 kgN/ha/yr, approximately seven times the worst-cast PC forecast from the generators (in Scenario 2E), while ammonia concentrations fluctuated by up to 0.1 μgm^{-3}, approximately ten times the worst-case PC from the generators to the closest part of this SSSI (also Scenario 2E).

6.3.5 Caporn et al (2016)[12] specifically addresses this point in sections 2.2.1 and 5.1 stating that 'The current rate of N deposition is primarily a proxy for long-term cumulative N deposition. Thus, we would not expect that a change in N deposition, either increasing or decreasing, would immediately change species richness or composition, but instead these would be gradually influenced by longer-term changes in N deposition'. Given this, and the fact that the fluctuations in background nitrogen deposition and ammonia concentrations are already considerable based on data from APIS, it is considered that the contributions of the generators would not materially influence long-term nitrogen deposition.

Reduced effect of increases in nitrogen deposition at higher background deposition rates

6.3.6 At both Minsmere to Walberswick Heaths and Marshes SSSI and Leiston-Aldeburgh SSSI existing nitrogen deposition already far exceeds the minimum critical load for the most sensitive habitats. At the closest part of both SSSIs to the SZC site, APIS indicates current background nitrogen deposition rates to short vegetation at 12.4 kgN/ha/yr (almost 2.5 times the critical load for the most sensitive habitats).

6.3.7 This is relevant because Caporn et al (2016), Table 21 and Appendix 5 shows that for many parameters (particularly botanical species richness) the scale of change from adding a given dose of nitrogen is smaller when the existing deposition rates are higher. For example, at background deposition rates of 10-15 kgN/ha/yr, an increase in long-term nitrogen deposition of 1.3 kgN/ha/yr (26% of the critical load) would be

[11] '*Typically, critical loads relate to the potential effects over periods of decades… critical loads provide the long-term deposition* [emphasis added] *below which we are sure that adverse ecosystem effects will not occur*', source: page 220, World Health Organization. 2000. Air Quality Guidelines for Europe. WHO Regional Publications, European Series, No. 91. Second Edition

[12] Caporn S., Field C., Payne R., Dise N., Britton A., Emmett B., Jones L., Phoenix G., Power S., Sheppard L. & Stevens C. (2016). Assessing the effects of small increments of atmospheric nitrogen deposition (above the critical load) on semi-natural habitats of conservation importance. Natural England Commissioned Reports, Number 210.

required in lowland heathland to reduce species richness by 1 species (note that this does not mean that any species are totally lost from the sward but that the frequency of their occurrence would reduce). In sand dunes an increase in long-term nitrogen deposition of 0.5 to 1.1 kgN/ha/yr would be required to reduce species richness by 1 species. Data were not available for coastal vegetated shingle. At lower background deposition rates, around the critical load (5 kgN/ha/yr), the necessary additional nitrogen doses to reduce species richness by 1 species fall by 50% to 66%.

6.3.8 These increases in deposition rate are similar to those which are forecast as a reasonable worst-case from the generators at the closest point of Minsmere to Walberswick Heaths and Marshes SSSI and Leiston-Aldeburgh SSSI. This illustrates that, while additional long-term nitrogen can have an effect whatever the background rates, that effect is much greater when the background rate is low, rather than when it is well above the critical load as in this case. At higher deposition rates the botanical effect, while measurable, is small. Moreover, the effects reported above assume that the new nitrogen source is effectively permanent (i.e. an annual input lasting decades). The report notes in Section 5.4.3 that '*it is very likely that any inferred reduction in species richness due to N is the product of many years of N deposition*'.

6.3.9 The limited effect of a specific incremental addition at increased background rates above the critical load is probably attributable to the fact that there is already ample nitrogen for more competitive plants to respond. Therefore, any botanical effect, while it might occur, is likely to be significantly less than it would be if background nitrogen deposition rates were lower.

Long-term changes in local environment

6.3.10 To facilitate construction of the Sizewell C project large areas of land are being removed from agricultural production either for the permanent footprint of the development, the temporary footprint of the development (e.g. which is relevant given the permit is being sought for a temporary source of emissions), or for mitigation areas. The Biodiversity Net Gain report for the project[13] identifies that approximately 145ha of arable land will be permanently removed from agricultural production to facilitate the main development, not including fields returned to arable land following construction which totals a further c. 38ha. A further c. 118ha of arable land is being removed from production to create the off-site mitigation areas (such as the marsh harrier habitat improvement area). The closest of these to Minsmere-Walberswick Heaths and Marshes SSSI is the marsh harrier compensation area, which is 100m away, while Aldhurst Farm, which amounts to 67ha in area and is now called Wild Aldhurst, is located approximately 1km west of Minsmere to Walberswick Heaths and Marshes SSSI.

6.3.11 All of the areas that will be removed permanently have now been moved out of production and will not be reverted. The removal of this land from agricultural production will reduce ammonia emissions within the associated grid squares and reduce nitrogen deposition on the designated sites in the long-term, illustrating that the current modelling is precautionary as it takes no account of that change in land use.

6.3.12 It is therefore concluded that there would be no significant effect on any SSSIs, including Minsmere to Walberswick Heaths & Marshes SSSI and Leiston-Aldeburgh SSSI, as a result of the three years of forecast emissions and resulting nitrogen deposition from the generators.

[13] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010012/EN010012-003968-Sizewell C Project - Other- Deadline 1 submission - Appendix 14E Biodiversity Net Gain Report.pdf

6.4 In-combination assessment

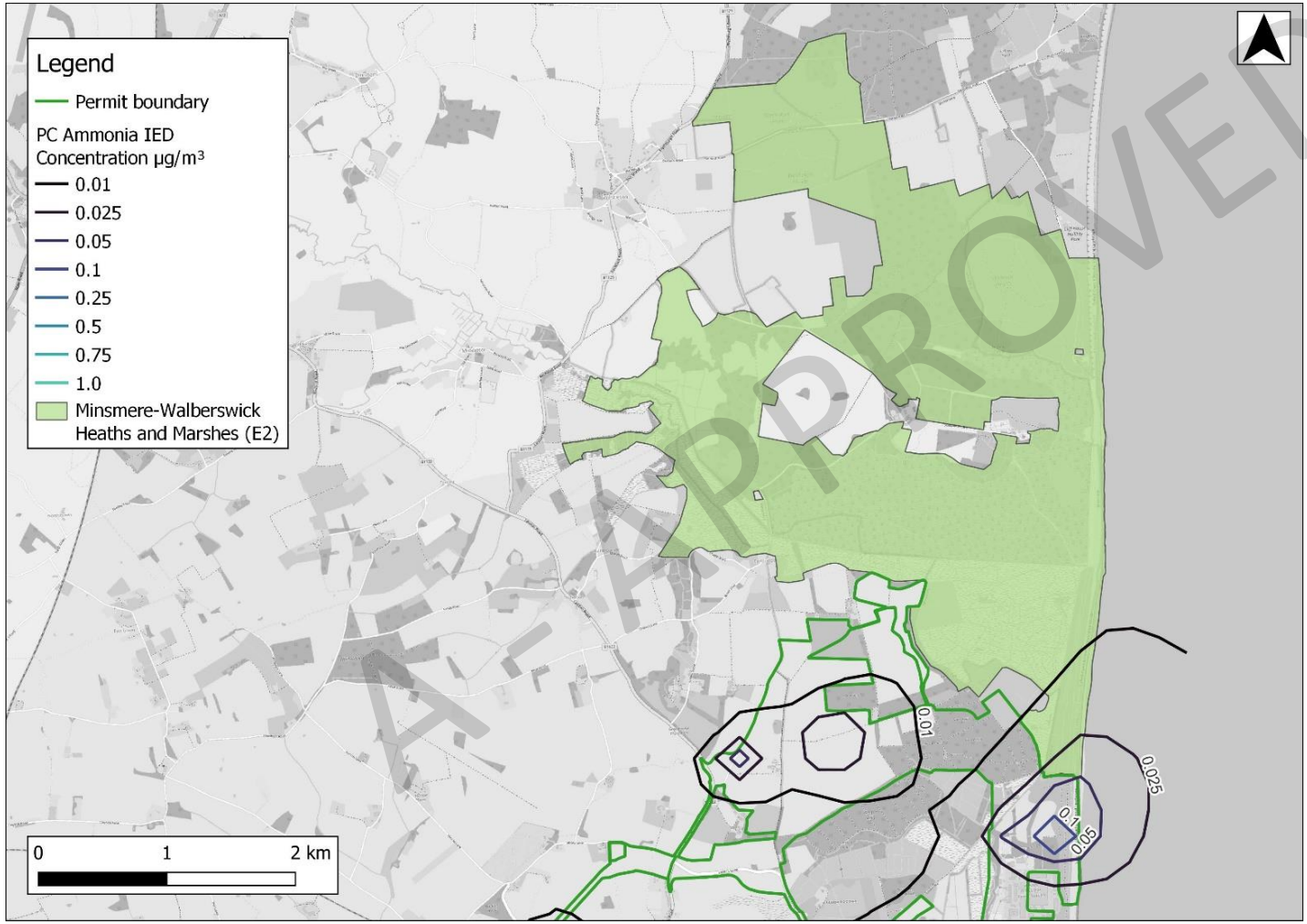
6.4.1 Under the CRoW Act, there is no formal requirement for an in-combination assessment to be undertaken. However, all the air quality modelling reported in this document has taken account of other 'in combination' or cumulative sources of atmospheric pollutants that will be emitted at the same time as the works for which a permit is being sought.

APPENDICES

A.1 Isopleth maps referenced in main text

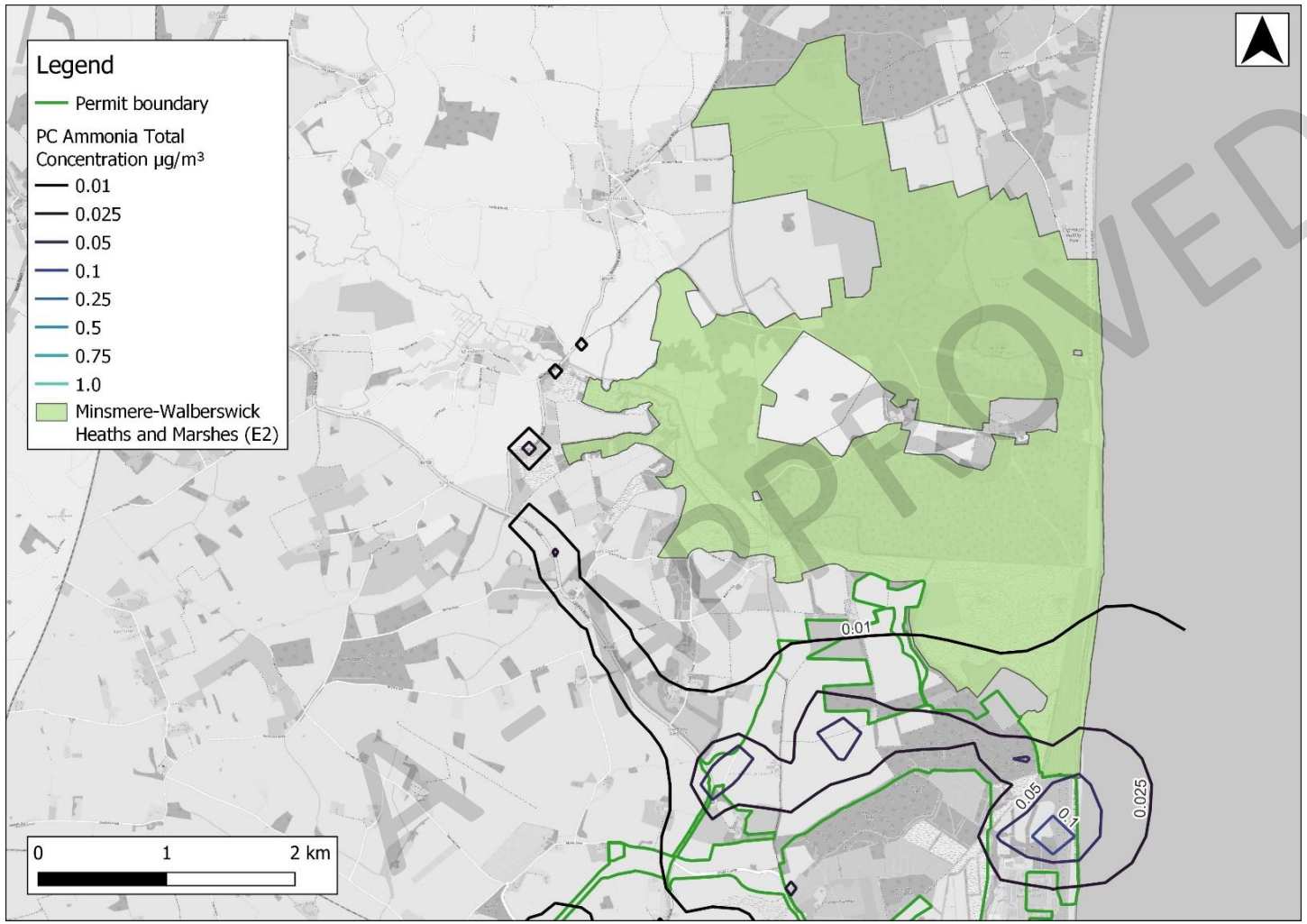
A.1.1 Scenario 1A (2024)

Ammonia 'alone' isopleths for Minsmere-Walberswick

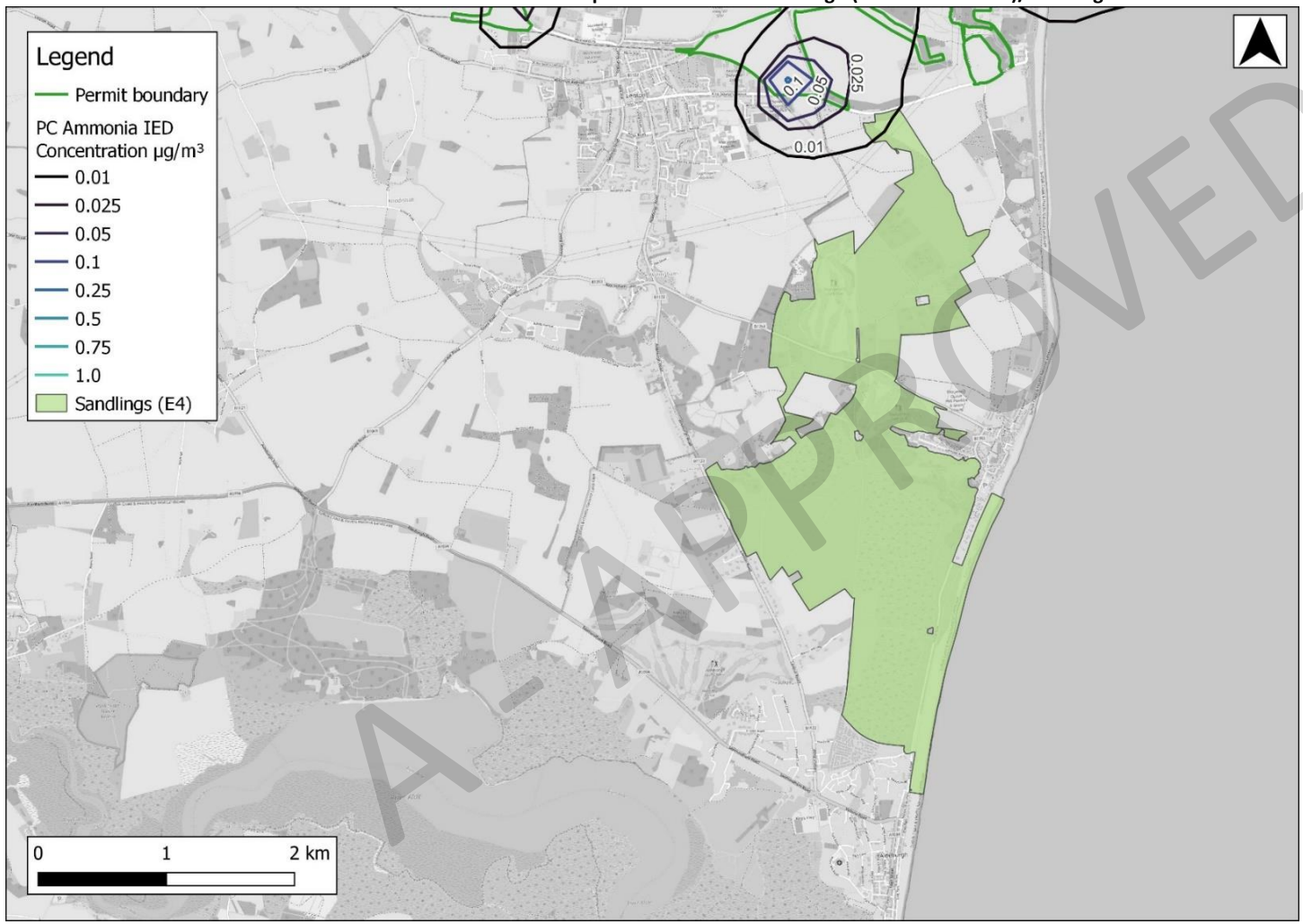


Ammonia 'in combination' isopleths for Minsmere-Walberswick

ANNEX 1: COUNTRYSIDE RIGHTS OF WAY (CROW) ACT REVIEW



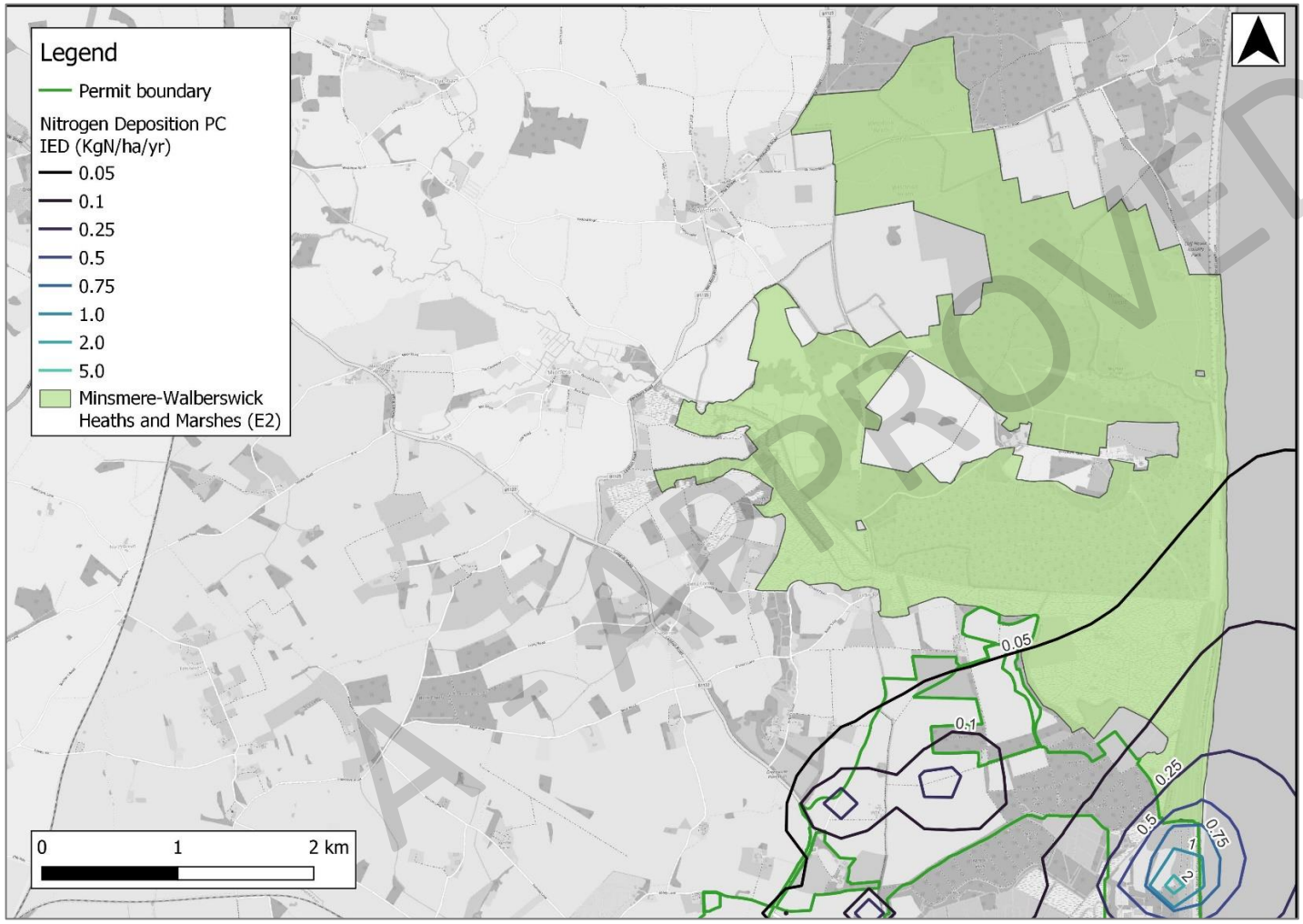
Ammonia 'alone' isopleths for Leiston-Aldeburgh (Northern Section)/Sandlings SPA



Ammonia 'in combination' isopleths for Leiston-Aldeburgh (Northern Section)/Sandlings SPA

ANNEX 1: COUNTRYSIDE RIGHTS OF WAY (CROW) ACT REVIEW

Nitrogen 'alone' isopleths for Minsmere-Walberswick



Nitrogen 'in combination' isopleths for Minsmere-Walberswick

Nitrogen 'alone' isopleths for Leiston-Aldeburgh (Northern Section)/Sandlings SPA

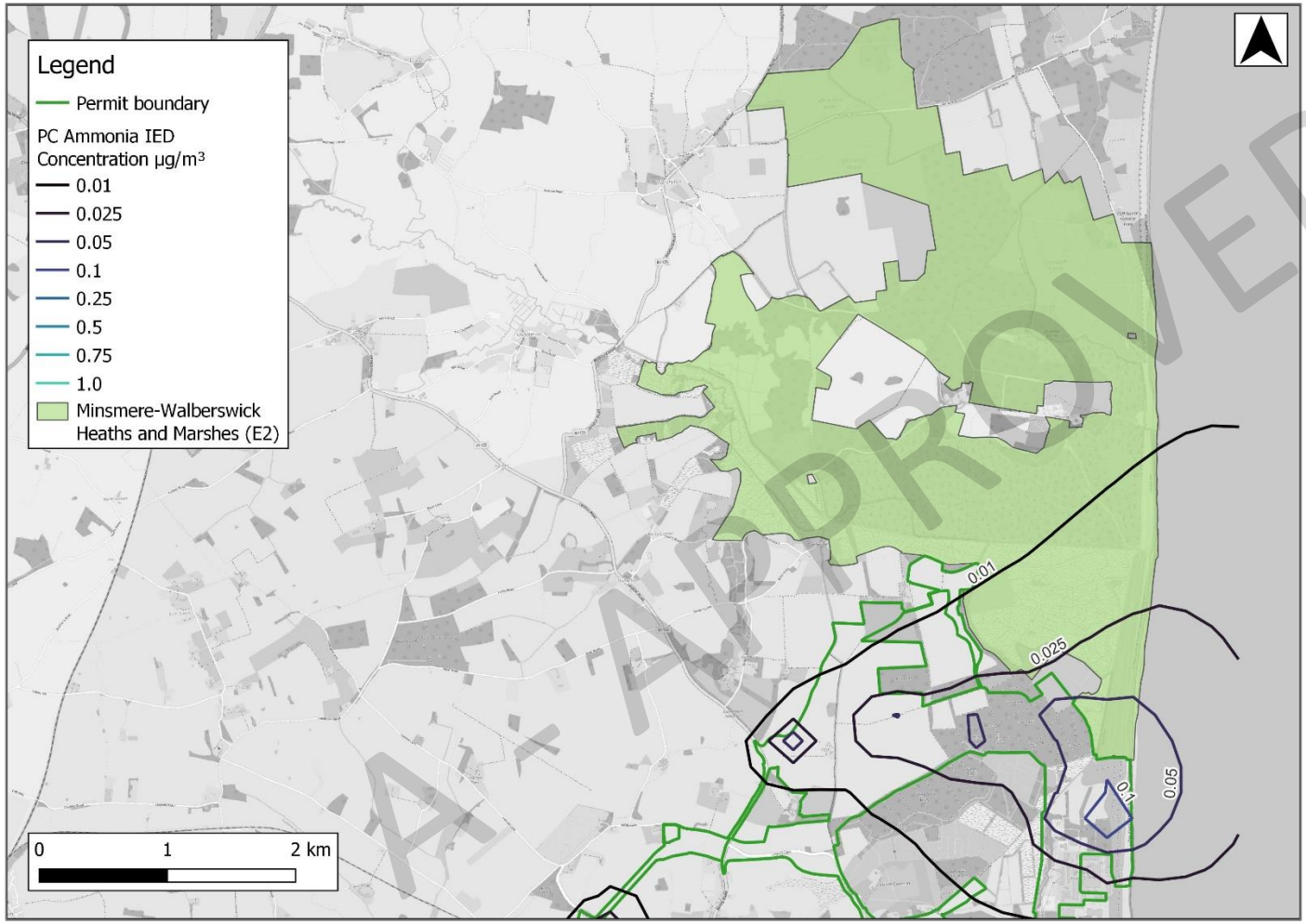
ANNEX 1: COUNTRYSIDE RIGHTS OF WAY (CROW) ACT REVIEW

Nitrogen 'in combination' isopleths for Leiston-Aldeburgh (Northern Section)/Sandlings SPA

A.1.2 Scenario 1A (2025)

Ammonia 'alone' isopleths for Minsmere-Walberswick

ANNEX 1: COUNTRYSIDE RIGHTS OF WAY (CROW) ACT REVIEW



Ammonia 'in combination' isopleths for Minsmere-Walberswick

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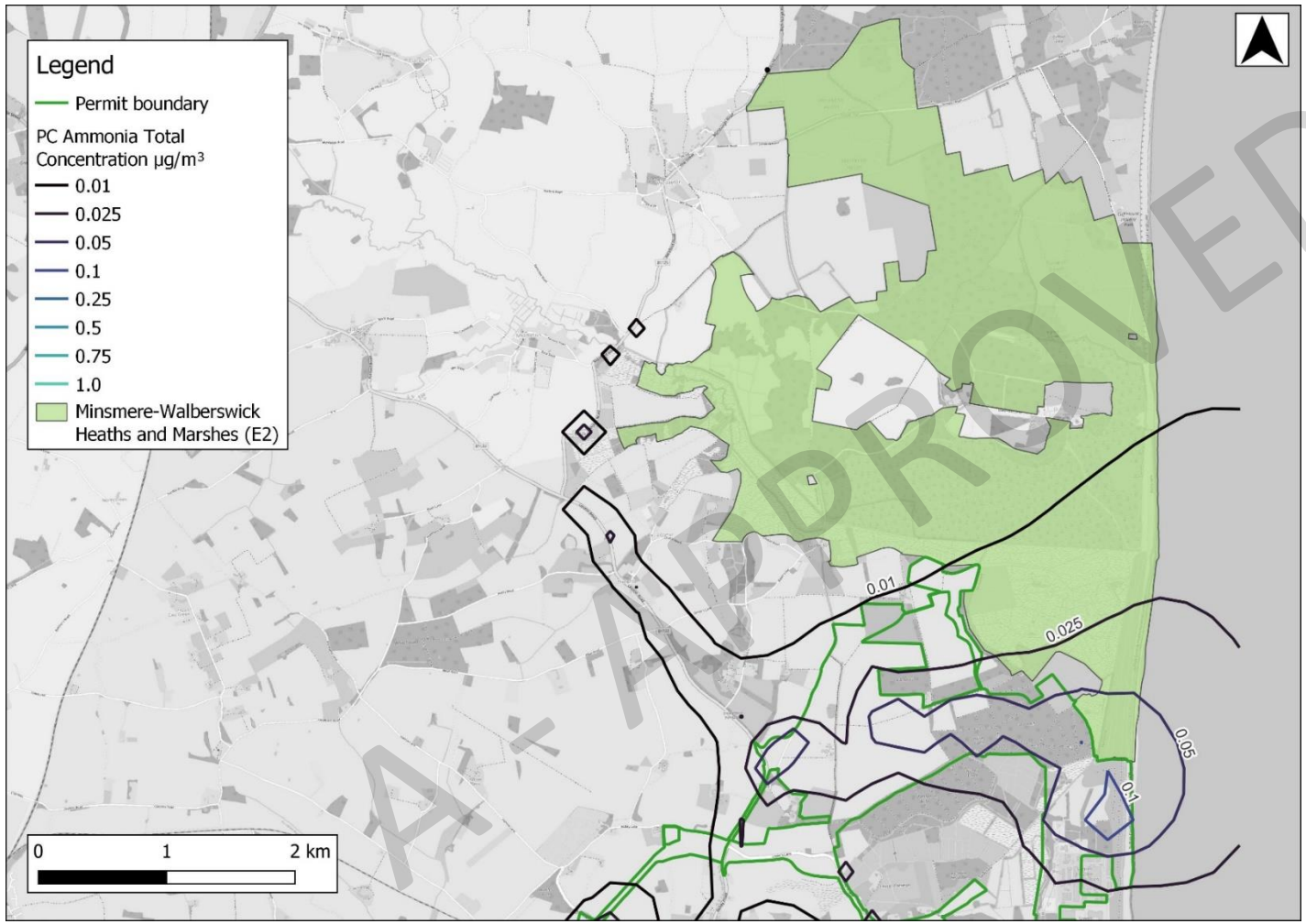
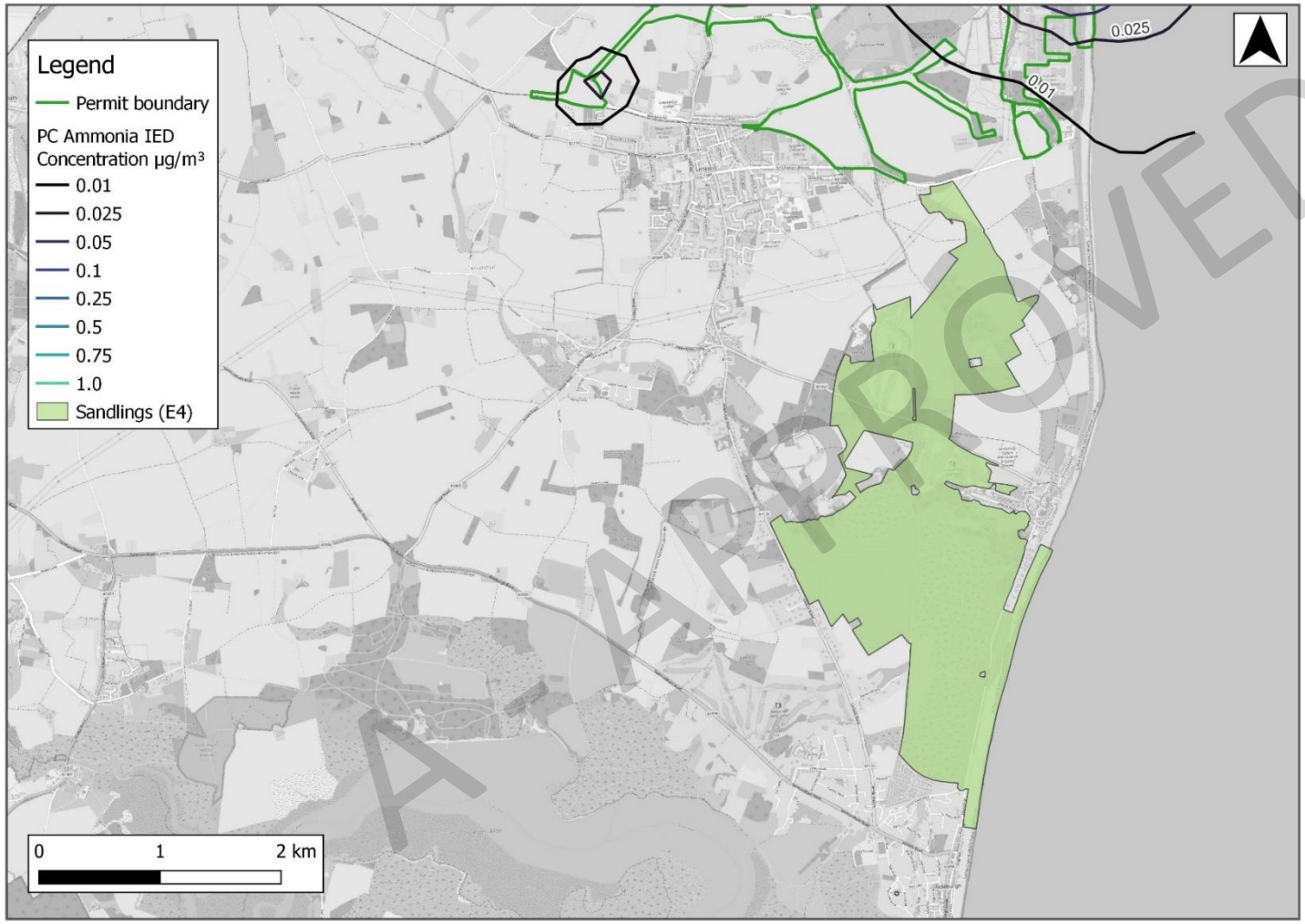


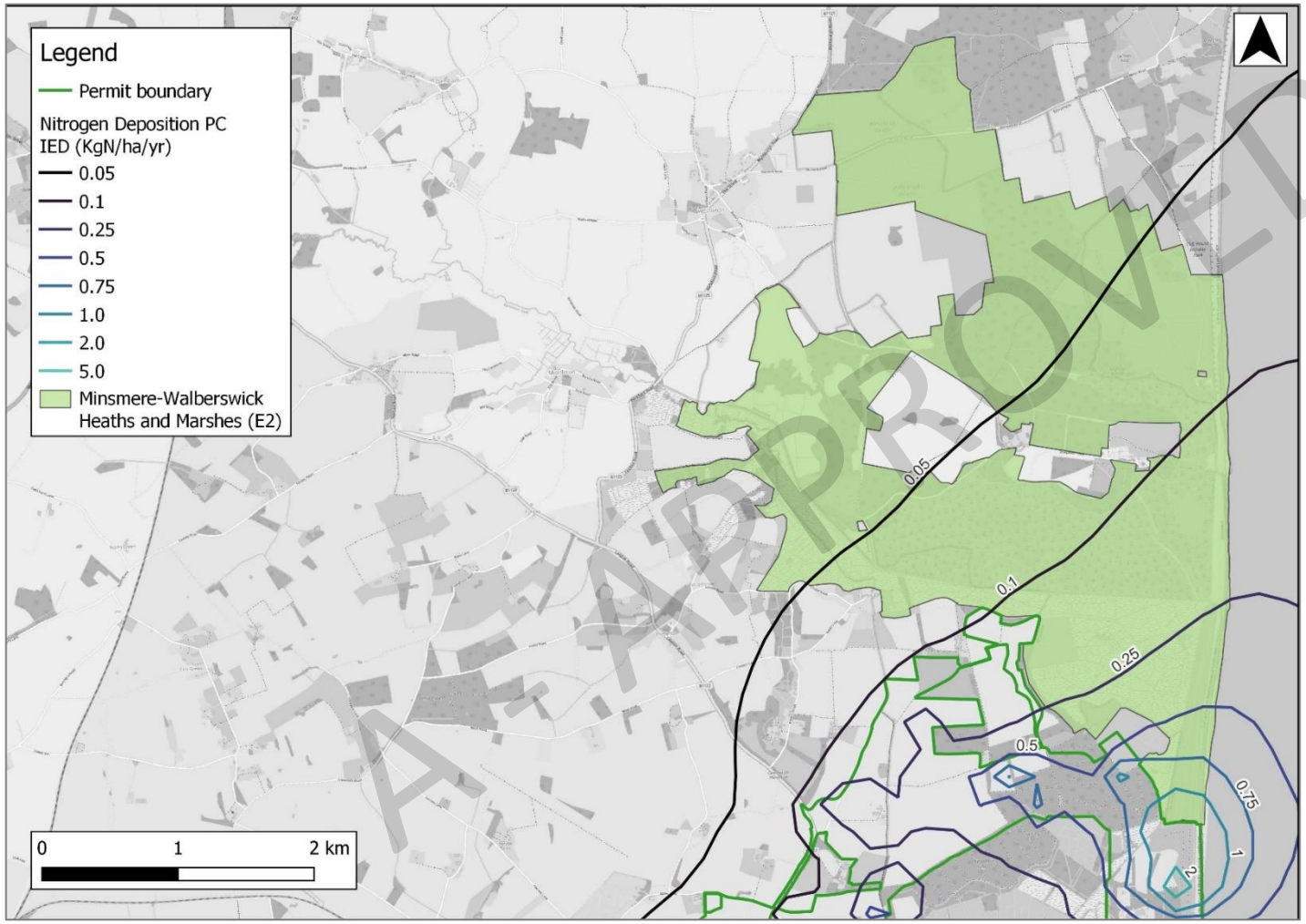
Ammonia 'alone' isopleths for Leiston-Aldeburgh (Northern Section)/Sandlings SPA



Ammonia 'in combination' isopleths for Leiston-Aldeburgh (Northern Section)/Sandlings SPA

ANNEX 1: COUNTRYSIDE RIGHTS OF WAY (CROW) ACT REVIEW

Nitrogen 'alone' isopleths for Minsmere-Walberswick



Nitrogen 'in combination' isopleths for Minsmere-Walberswick

Nitrogen 'alone' isopleths for Leiston-Aldeburgh (Northern Section)/Sandlings SPA

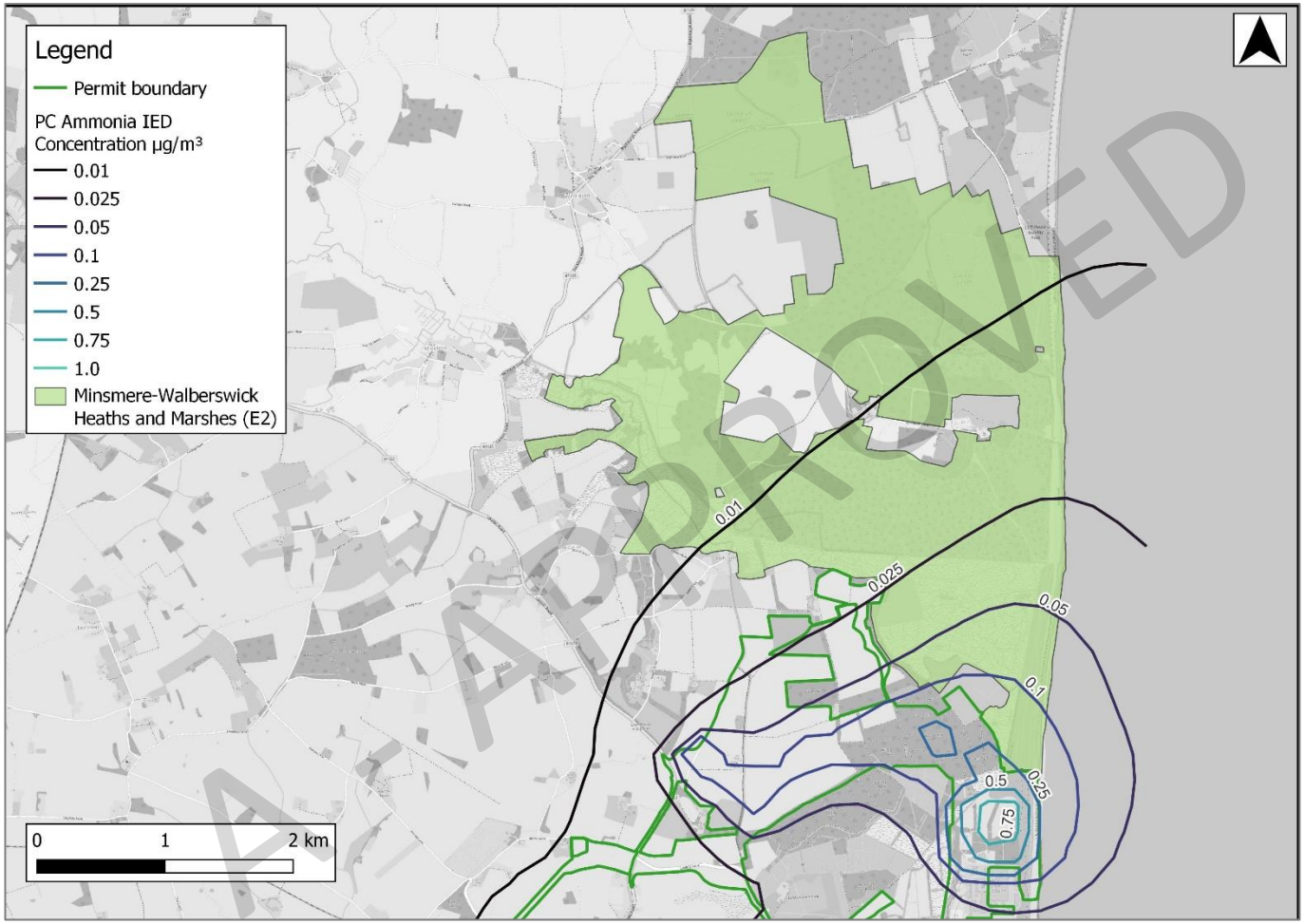
ANNEX 1: COUNTRYSIDE RIGHTS OF WAY (CROW) ACT REVIEW

Nitrogen 'in combination' isopleths for Leiston-Aldeburgh (Northern Section)/Sandlings SPA

NOT PROTECTIVELY MARKED

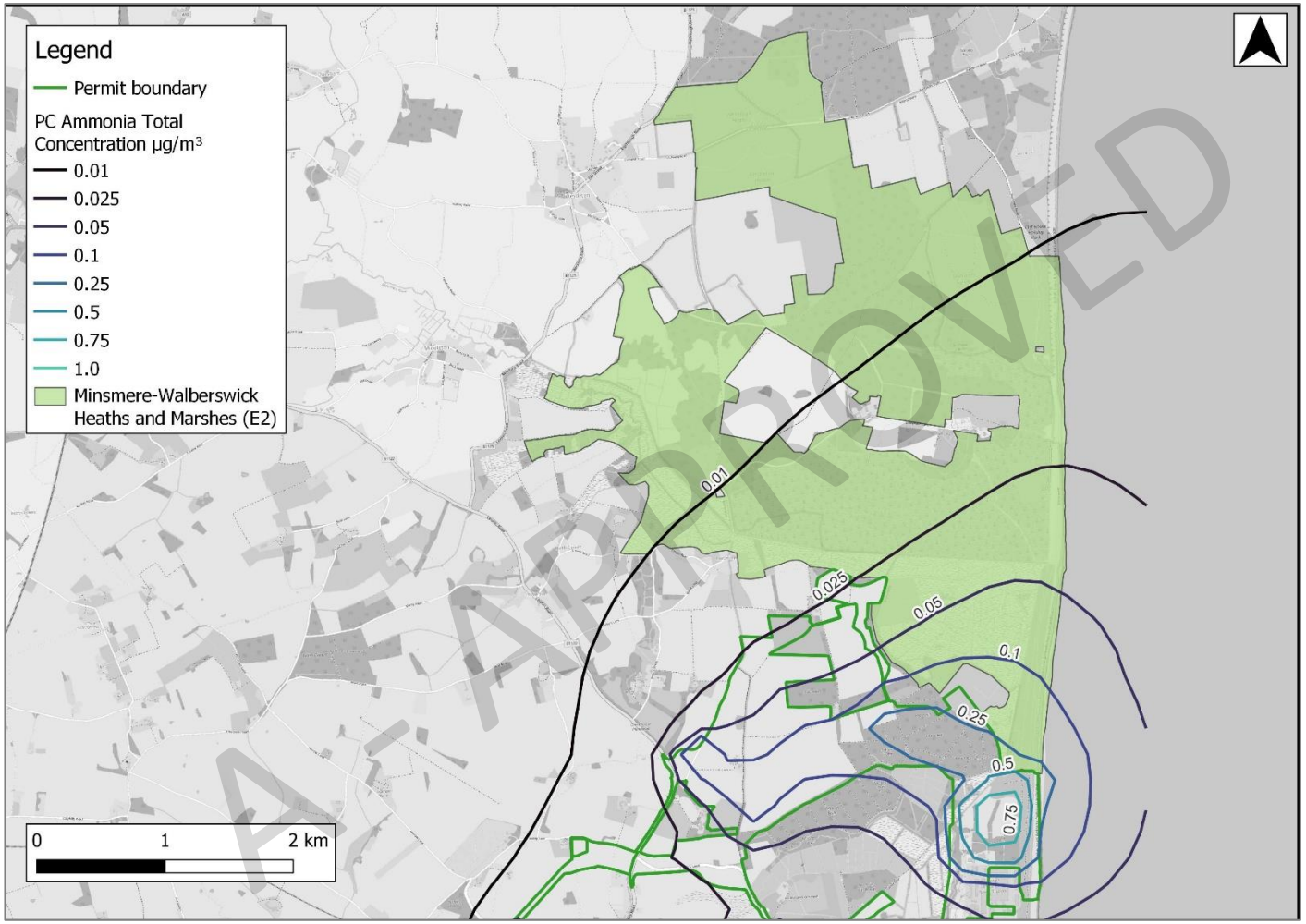
A.1.3 Scenario 2E

Ammonia 'alone' isopleths for Minsmere-Walberswick



Ammonia 'in combination' isopleths for Minsmere-Walberswick

ANNEX 1: COUNTRYSIDE RIGHTS OF WAY (CROW) ACT REVIEW



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Ammonia 'alone' isopleths for Leiston-Aldeburgh (Northern Section)/Sandlings SPA

Ammonia 'in combination' isopleths for Leiston-Aldeburgh (Northern Section)/Sandlings SPA

Nitrogen 'alone' isopleths for Minsmere-Walberswick

ANNEX 1: COUNTRYSIDE RIGHTS OF WAY (CROW) ACT REVIEW

Nitrogen 'in combination' isopleths for Minsmere-Walberswick

Nitrogen 'alone' isopleths for Leiston-Aldeburgh (Northern Section)/Sandlings SPA

Nitrogen 'in combination' isopleths for Leiston-Aldeburgh (Northern Section)/Sandlings SPA

ANNEX 1: COUNTRYSIDE RIGHTS OF WAY (CROW) ACT REVIEW

NOT PROTECTIVELY MARKED