The Sizewell C Project

5.10 Shadow Habitats Regulations Assessment Addendum Appendices 1A-10A Part 5 of 5

Revision: 1.0

Applicable Regulation: Regulation 5(2)(e)

PINS Reference Number: EN010012

January 2021

Planning Act 2008
Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

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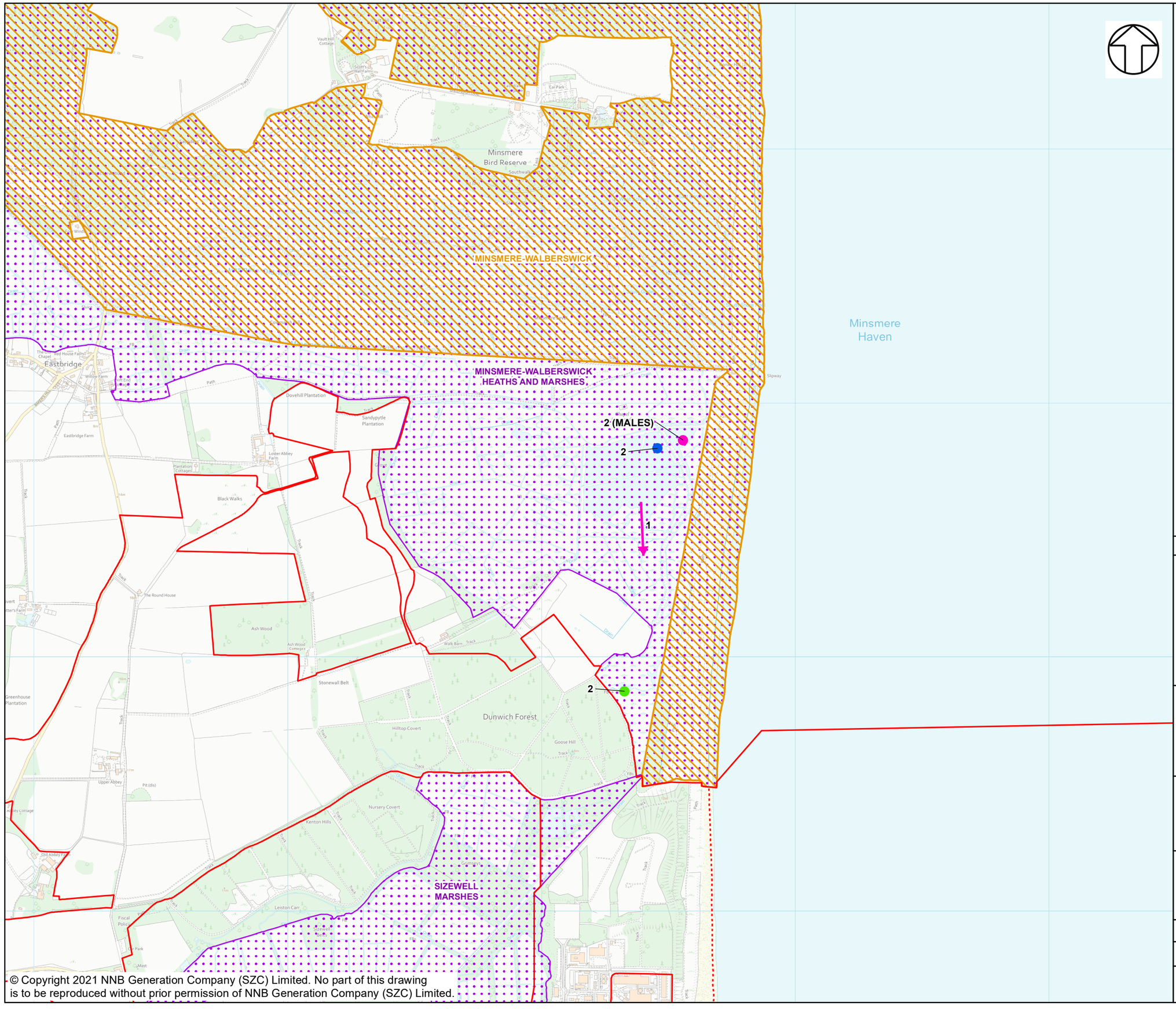

NOTES

KEY

- SIZEWELL C MAIN DEVELOPMENT SITE BOUNDARY
- DEMARCATION LINE

DESIGNATIONS

- SPECIAL PROTECTION AREA (SPA)
- SITE OF SPECIAL SCIENTIFIC INTEREST (SSSI)

SHOVELER BREEDING SEASON ABUNDANCE AND DISTRIBUTION IN THE MINSMERE SOUTH LEVELS AND SIZEWELL MARSHES IN 2020*

- APRIL 2020
- MAY 2020
- JUNE 2020
- MAY 2020

* N INDICATES THE NUMBER OF INDIVIDUALS FOR EACH RECORD. INDIVIDUALS ARE ADULTS OF UNIDENTIFIED SEX UNLESS INDICATED OTHERWISE

NOT PROTECTIVELY MARKED

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DOCUMENT:
SIZEWELL C PROJECT
SHADOW HRA REPORT ADDENDUM
APPENDIX 6A
FIGURES (BASELINE)

DRAWING TITLE:
BREEDING SEASON ABUNDANCE AND DISTRIBUTION OF SHOVELER IN THE MINSMERE SOUTH LEVELS AND SIZEWELL MARSHES IN 2020 AS DETERMINED FROM DEDICATED WATERBIRD SURVEYS IN APRIL, MAY AND JUNE

DRAWING NO:
FIGURE 6A.17

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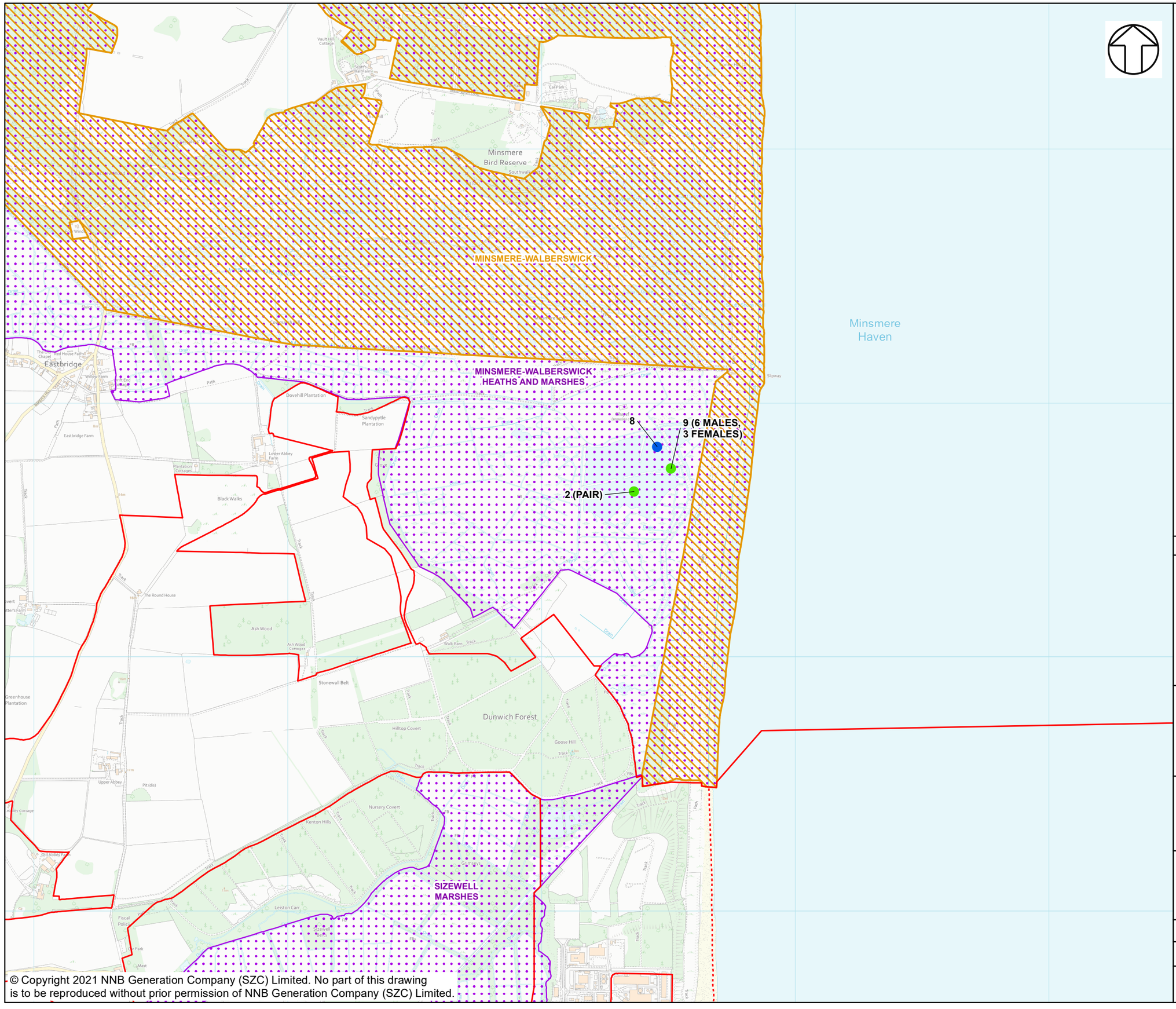

NOTES

KEY

- SIZEWELL C MAIN DEVELOPMENT SITE BOUNDARY
- DEMARCATION LINE

DESIGNATIONS

- SPECIAL PROTECTION AREA (SPA)
- SITE OF SPECIAL SCIENTIFIC INTEREST (SSSI)

TEAL BREEDING SEASON ABUNDANCE AND DISTRIBUTION IN THE MINSMERE SOUTH LEVELS AND SIZEWELL MARSHES IN 2020*

- APRIL 2020
- JUNE 2020

* N INDICATES THE NUMBER OF INDIVIDUALS FOR EACH RECORD. INDIVIDUALS ARE ADULTS OF UNIDENTIFIED SEX UNLESS INDICATED OTHERWISE

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DOCUMENT:
SIZEWELL C PROJECT
SHADOW HRA REPORT ADDENDUM
APPENDIX 6A
FIGURES (BASELINE)

DRAWING TITLE:
BREEDING SEASON ABUNDANCE AND DISTRIBUTION OF TEAL IN THE MINSMERE SOUTH LEVELS AND SIZEWELL MARSHES IN 2020 AS DETERMINED FROM DEDICATED WATERBIRD SURVEYS IN APRIL, MAY AND JUNE

DRAWING NO:
FIGURE 6A.18

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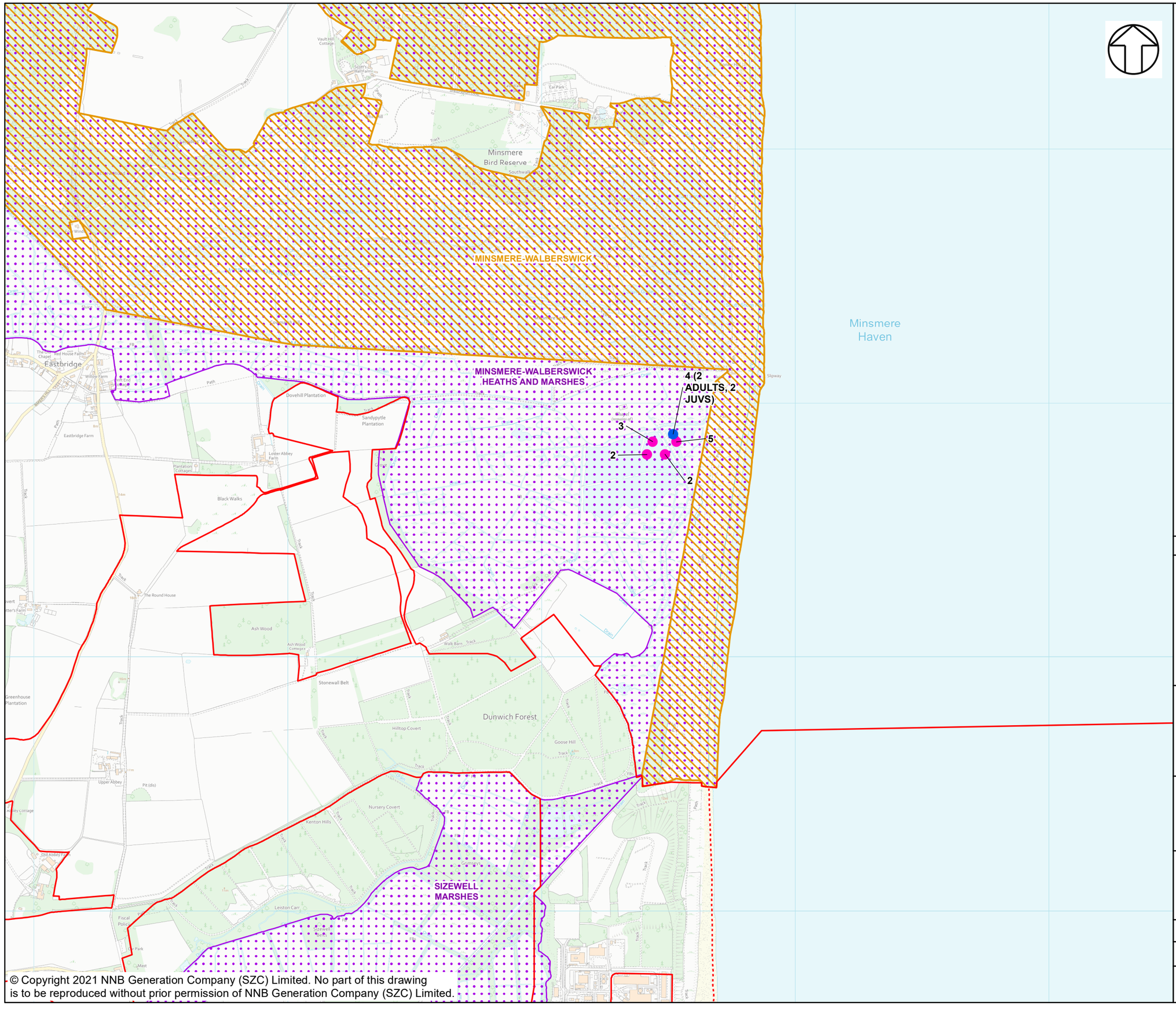

NOTES

KEY

SIZEWELL C MAIN DEVELOPMENT SITE BOUNDARY

DEMARCATION LINE

DESIGNATIONS

SPECIAL PROTECTION AREA (SPA)

SITE OF SPECIAL SCIENTIFIC INTEREST (SSSI)

AVOCET BREEDING SEASON ABUNDANCE AND DISTRIBUTION IN THE MINSMERE SOUTH LEVELS AND SIZEWELL MARSHES IN 2020*

MAY 2020

JUNE 2020

* N INDICATES THE NUMBER OF INDIVIDUALS FOR EACH RECORD. INDIVIDUALS ARE ADULTS OF UNIDENTIFIED SEX UNLESS INDICATED OTHERWISE

NOT PROTECTIVELY MARKED

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DOCUMENT:
SIZEWELL C PROJECT
SHADOW HRA REPORT ADDENDUM
APPENDIX 6A
FIGURES (BASELINE)

DRAWING TITLE:
BREEDING SEASON ABUNDANCE AND DISTRIBUTION OF AVOCET IN THE MINSMERE SOUTH LEVELS AND SIZEWELL MARSHES IN 2020 AS DETERMINED FROM DEDICATED WATERBIRD SURVEYS IN APRIL, MAY AND JUNE

DRAWING NO:
FIGURE 6A.19

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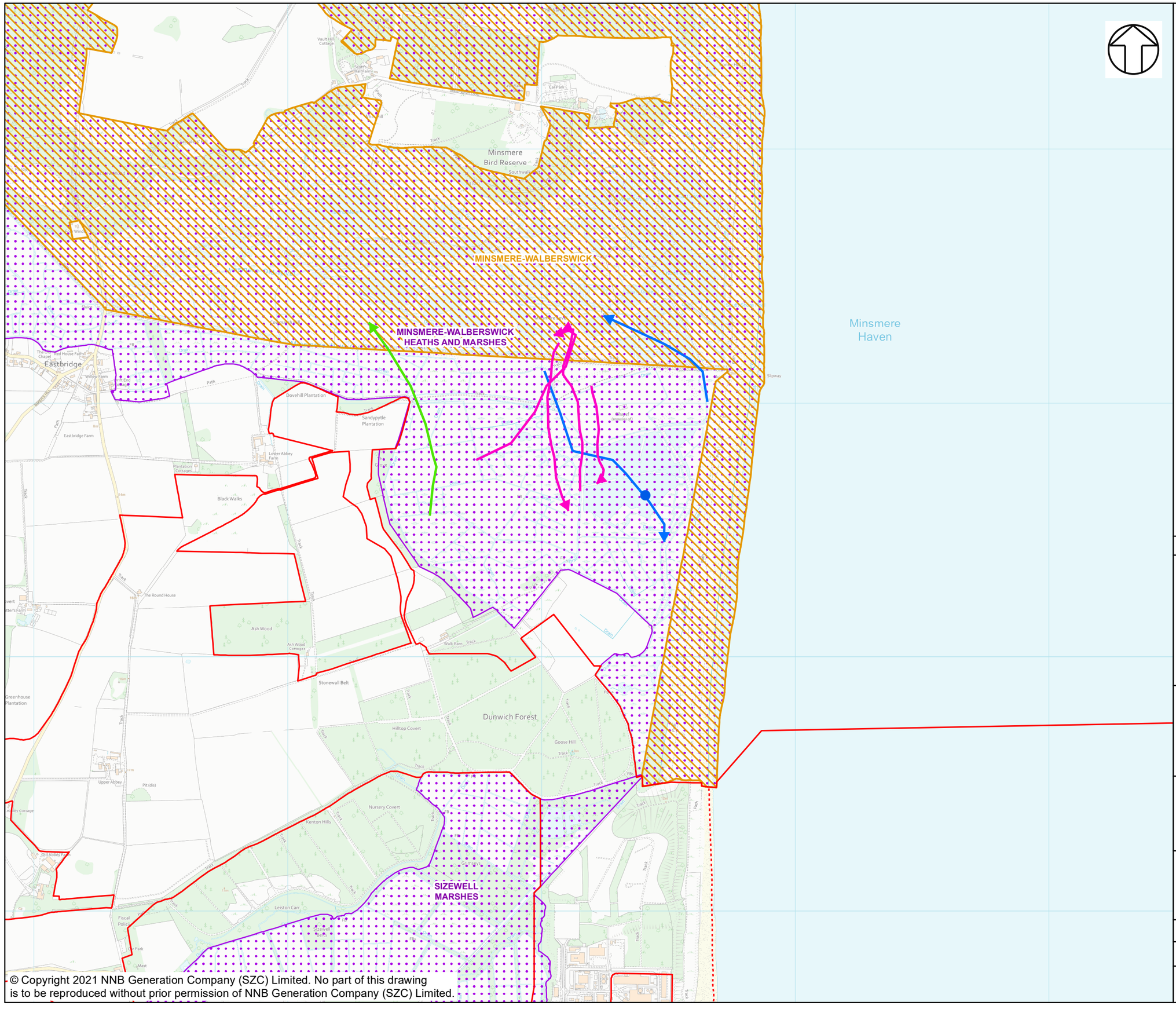

NOTES

KEY

- SIZEWELL C MAIN DEVELOPMENT SITE BOUNDARY
- DEMARCATION LINE

DESIGNATIONS

- SPECIAL PROTECTION AREA (SPA)
- SITE OF SPECIAL SCIENTIFIC INTEREST (SSSI)

BITTERN BREEDING SEASON OCCURRENCE IN THE MINSMERE SOUTH LEVELS AND SIZEWELL MARSHES IN 2020*

- JUNE 2020
- APRIL 2020
- MAY 2020
- JUNE 2020

* ALL RECORDS ARE OF SINGLE INDIVIDUALS

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DOCUMENT:
SIZEWELL C PROJECT
SHADOW HRA REPORT ADDENDUM
APPENDIX 6A
FIGURES (BASELINE)

DRAWING TITLE:
BREEDING SEASON OCCURRENCE OF BITTERN IN THE MINSMERE SOUTH LEVELS AND SIZEWELL MARSHES IN 2020 AS DETERMINED FROM DEDICATED WATERBIRD SURVEYS AND INCIDENTAL RECORDS IN APRIL, MAY AND JUNE

DRAWING NO:
FIGURE 6A.20

DATE:	DRAWN:	SCALE :	REVISION:
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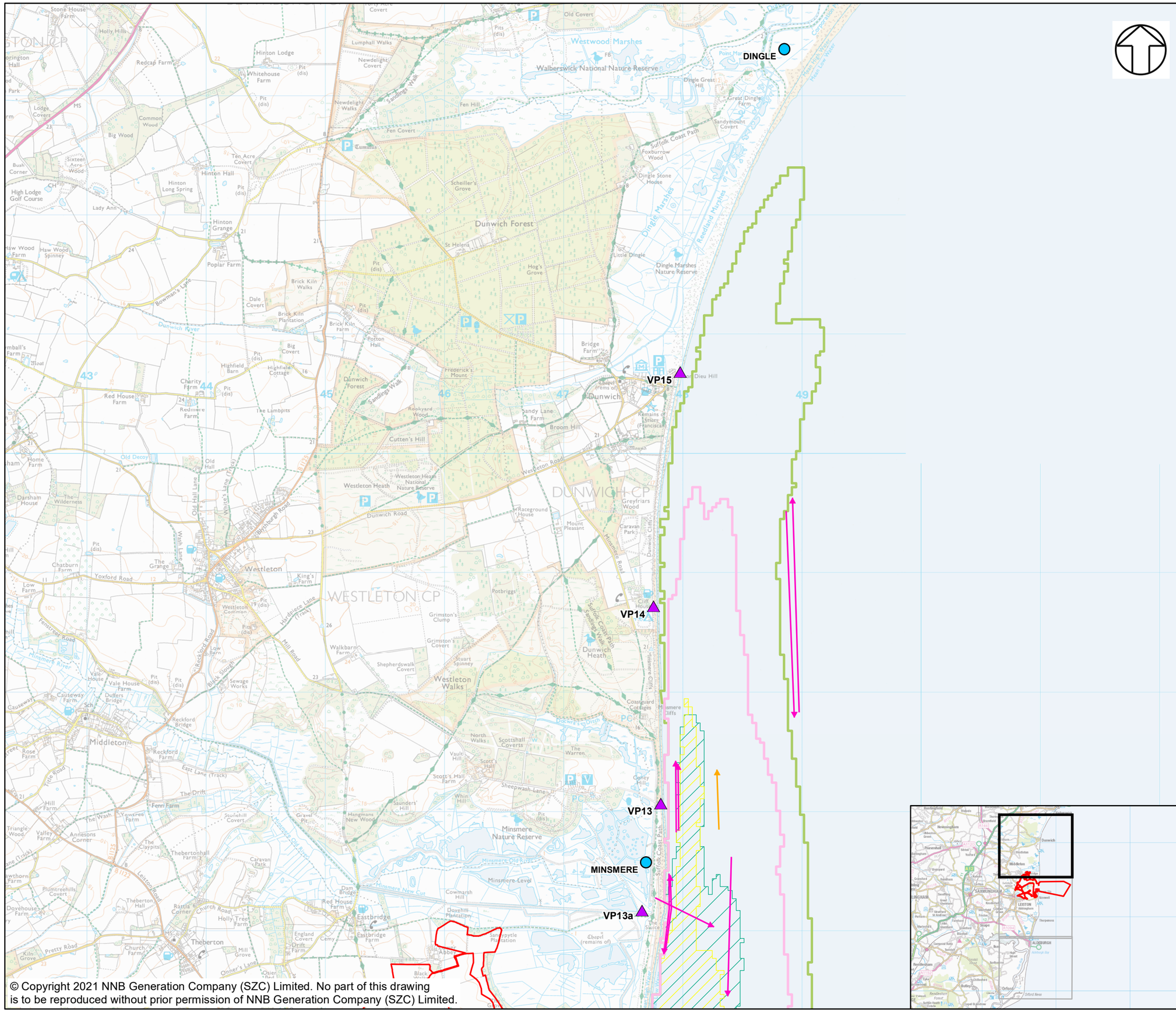
APPENDIX 8A: FIGURES (BIRD ASSESSMENT)



NOTES

KEY

- SIZEWELL C MAIN DEVELOPMENT SITE BOUNDARY
- TERN SURVEY VANTAGE POINTS
- SEABIRD COLONY

SPECIES OF TERN

- COMMON TERN
- SANDWICH TERN

PREDICTED CHEMICAL AND THERMAL PLUMES FROM SZB

- BOUNDARY OF THERMAL UPLIFT AT ≥ 2°C AT SEA SURFACE AS 98TH PERCENTILE FOR SZB ALONE
- BOUNDARY OF THERMAL UPLIFT AT ≥ 3°C AT SEA SURFACE AS 98TH PERCENTILE FOR SZB ALONE
- BROMOFORM AT ≥ 5µg/l AT SEA SURFACE AS 95TH PERCENTILE FOR SZB
- TOTAL RESIDUAL OXIDANTS AT ≥ 10µg/l AT SEA SURFACE AS 95TH PERCENTILE FOR SZB

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DOCUMENT:
SIZEWELL C PROJECT
SHADOW HRA REPORT ADDENDUM
APPENDIX 6A
FIGURES (BASELINE)

DRAWING TITLE:
LOCATIONS OF FORAGING TERNS RECORDED DURING THE FIRST JULY SURVEY IN 2020, WITH PREDICTED CHEMICAL AND THERMAL PLUMES FROM SZB ALSO SHOWN.

DRAWING NO: FIGURE 6A.6 — MAP 1 OF 3

DATE:	DRAWN:	SCALE :	REVISION:
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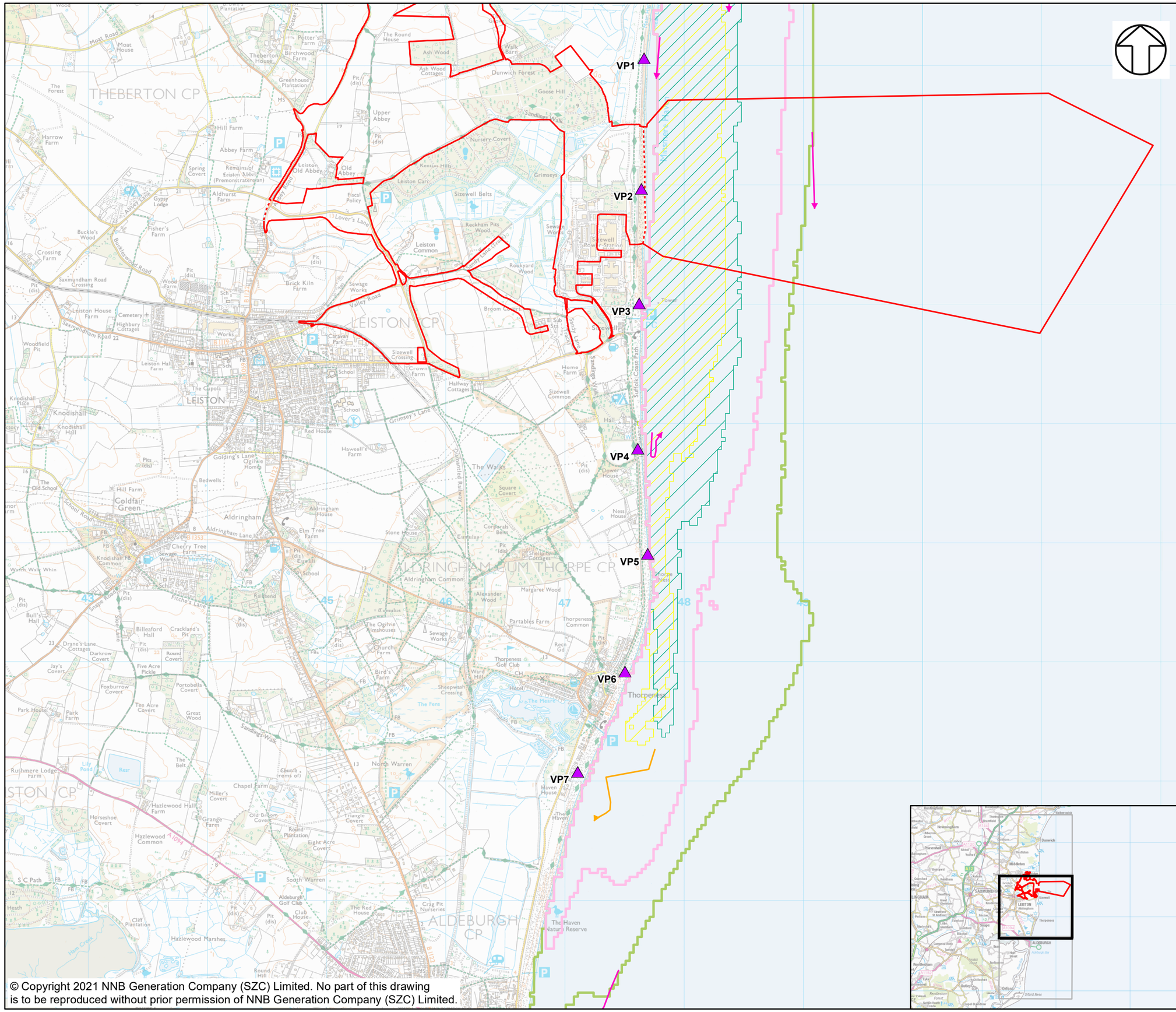

NOTES

KEY

- SIZEWELL C MAIN DEVELOPMENT SITE BOUNDARY
- DEMARCATION LINE
- TERN SURVEY VANTAGE POINTS

SPECIES OF TERN

- COMMON TERN
- SANDWICH TERN

PREDICTED CHEMICAL AND THERMAL PLUMES FROM SZB

- BOUNDARY OF THERMAL UPLIFT AT ≥ 2°C AT SEA SURFACE AS 98TH PERCENTILE FOR SZB ALONE
- BOUNDARY OF THERMAL UPLIFT AT ≥ 3°C AT SEA SURFACE AS 98TH PERCENTILE FOR SZB ALONE
- BROMOFORM AT ≥ 5µg/l AT SEA SURFACE AS 95TH PERCENTILE FOR SZB
- TOTAL RESIDUAL OXIDANTS AT ≥ 10µg/l AT SEA SURFACE AS 95TH PERCENTILE FOR SZB

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DOCUMENT:
SIZEWELL C PROJECT
SHADOW HRA REPORT ADDENDUM
APPENDIX 6A
FIGURES (BASELINE)

DRAWING TITLE:
LOCATIONS OF FORAGING TERNS RECORDED DURING THE FIRST JULY SURVEY IN 2020, WITH PREDICTED CHEMICAL AND THERMAL PLUMES FROM SZB ALSO SHOWN.

DRAWING NO: FIGURE 6A.6
MAP 2 OF 3

DATE:	DRAWN:	SCALE :	REVISION:
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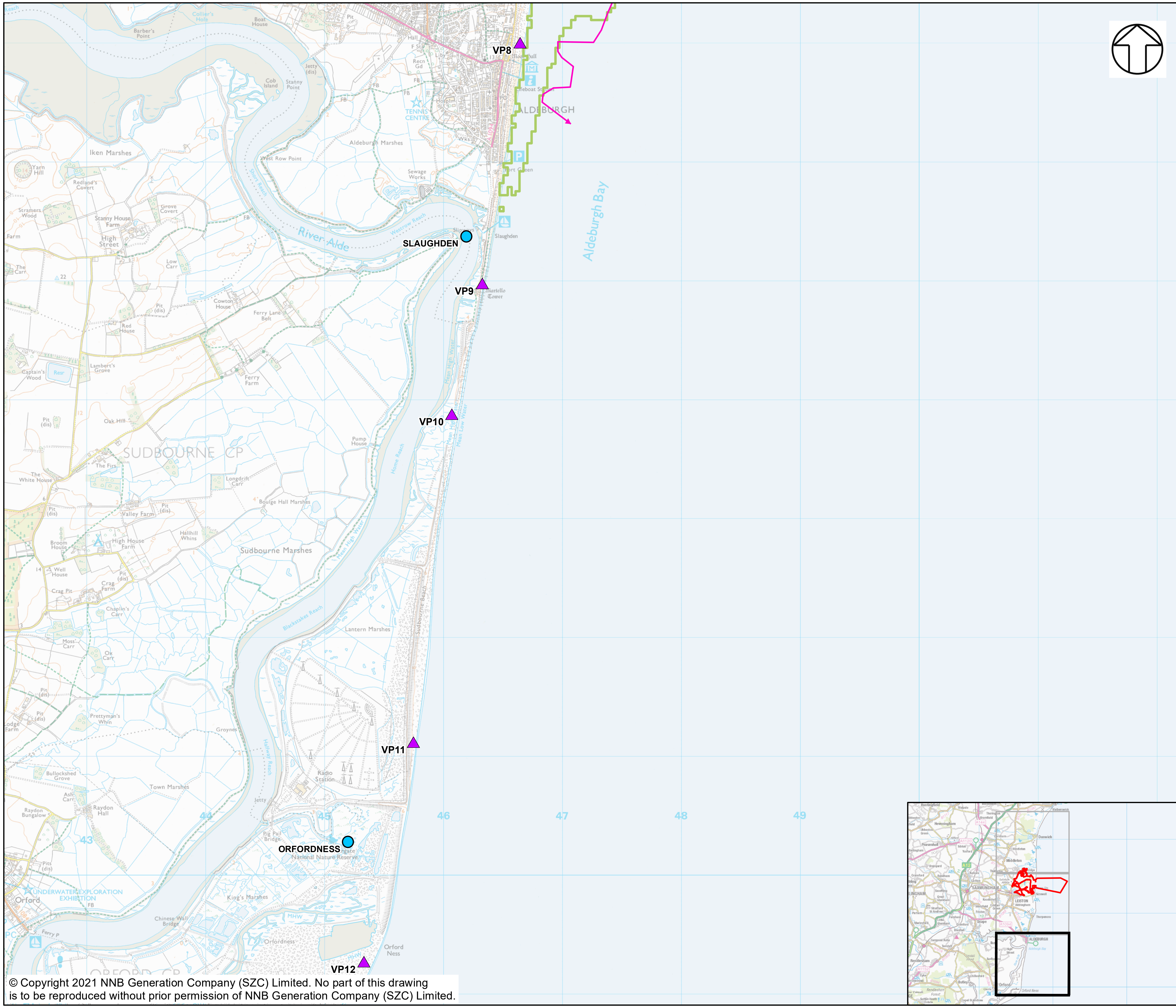

NOTES

KEY

- TERN SURVEY VANTAGE POINTS
- SEABIRD COLONY

SPECIES OF TERN

- COMMON TERN

PREDICTED CHEMICAL AND THERMAL PLUMES FROM SZB

- BOUNDARY OF THERMAL UPLIFT AT ≥ 2^{O}C AT SEA SURFACE AS 98TH PERCENTILE FOR SZB ALONE

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DOCUMENT:
SIZEWELL C PROJECT
SHADOW HRA REPORT ADDENDUM
APPENDIX 6A
FIGURES (BASELINE)

DRAWING TITLE:
LOCATIONS OF FORAGING TERNS RECORDED DURING THE FIRST JULY SURVEY IN 2020, WITH PREDICTED CHEMICAL AND THERMAL PLUMES FROM SZB ALSO SHOWN.

DRAWING NO:			MAP 3 OF 3
FIGURE 6A.6			
DATE:	DRAWN:	SCALE :	REVISION:
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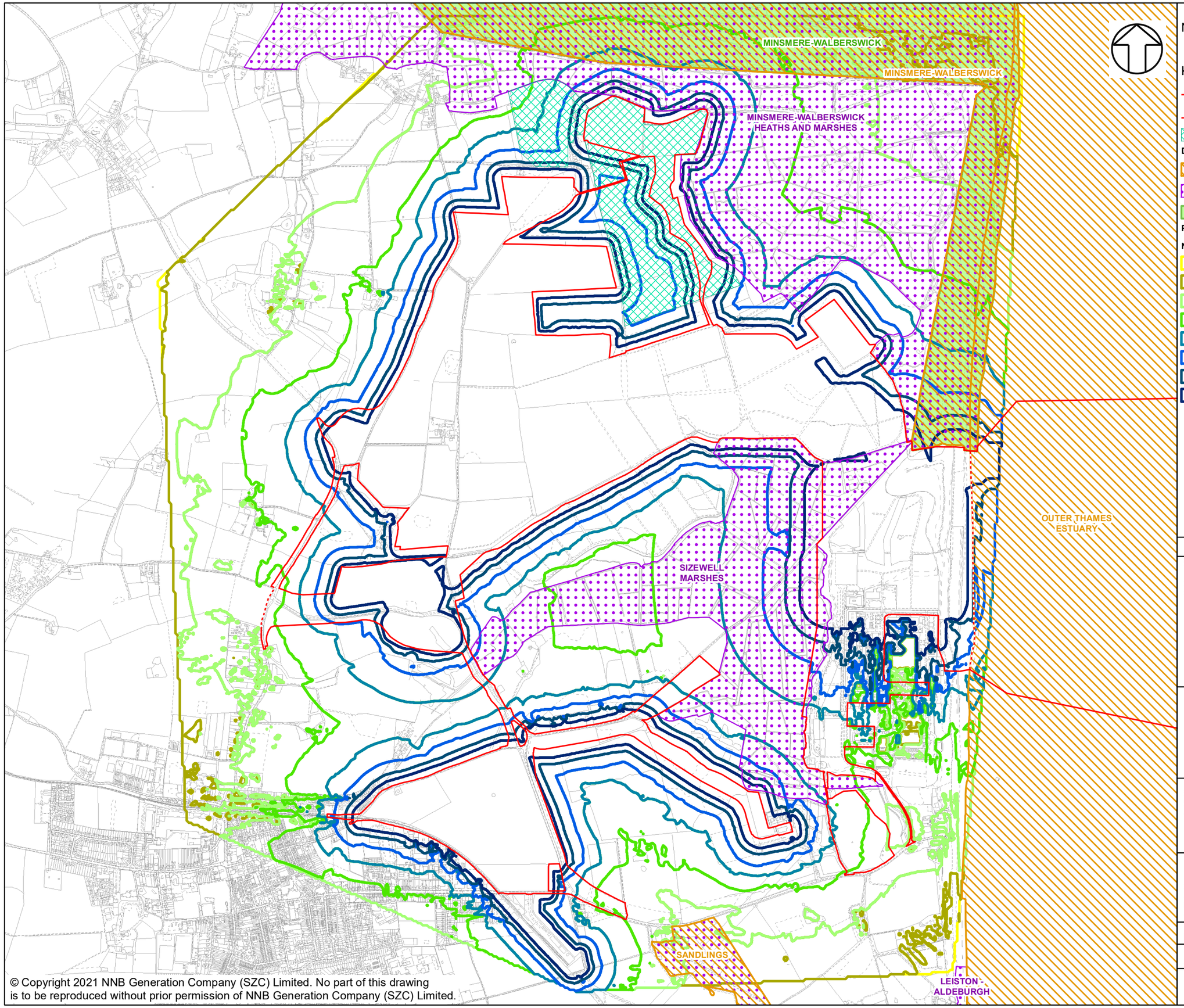

NOTES

KEY

- SIZEWELL C MAIN DEVELOPMENT SITE BOUNDARY
- DEMARCATION LINE
- HARRIER HABITAT IMPROVEMENT AREA

DESIGNATIONS

- SPECIAL PROTECTION AREA (SPA)
- SITE OF SPECIAL SCIENTIFIC INTEREST (SSSI)
- RAMSAR SITE

PHASE 1 (DAYTIME) L_{Amax}

NOISE LEVEL (dB)

- <= 55
- 55 - 60
- 60 - 65
- 65 - 70
- 70 - 75
- 75 - 80
- 80 - 85
- >= 85

NOT PROTECTIVELY MARKED

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DOCUMENT:
SIZEWELL C PROJECT
SHADOW HRA REPORT ADDENDUM
APPENDIX 8A
FIGURES (BASELINE)

DRAWING TITLE:
PREDICTED PEAK NOISE AT 3M ELEVATION FOR DAYTIME IN THE FIRST WINTER OF PHASE 1 CONSTRUCTION FOR SIZEWELL C BASED ON UPDATED NOISE MODELLING. MODELLING INCORPORATES THE CONSTRUCTION OF THE WATER STORAGE AREA DURING THE FIRST WINTER.

DRAWING NO:
FIGURE 8A.1

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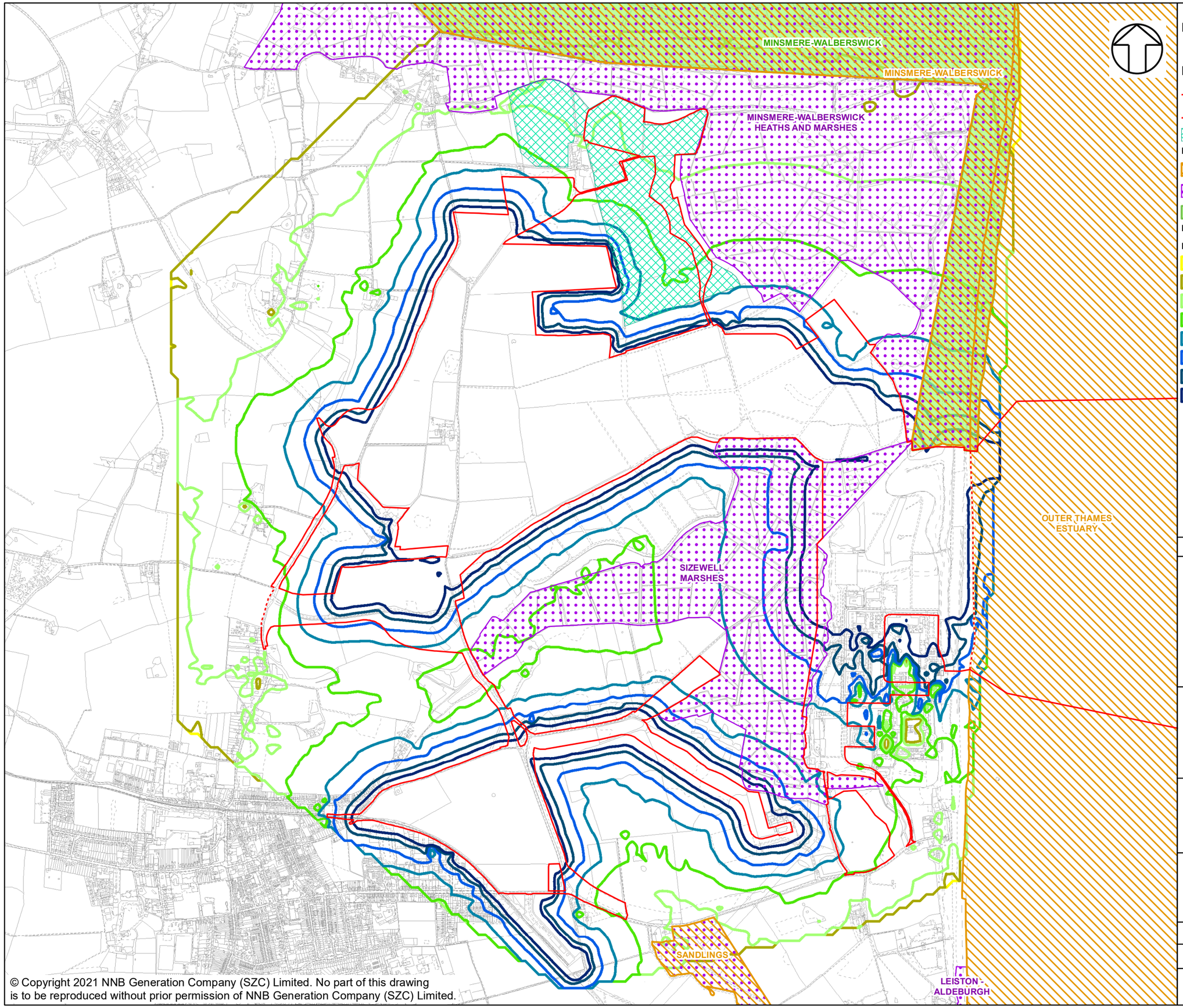

NOTES

KEY

- SIZEWELL C MAIN DEVELOPMENT SITE BOUNDARY
- DEMARCATION LINE
- HARRIER HABITAT IMPROVEMENT AREA

DESIGNATIONS

- SPECIAL PROTECTION AREA (SPA)
- SITE OF SPECIAL SCIENTIFIC INTEREST (SSSI)
- RAMSAR SITE

PHASE 2 (DAYTIME) L_{Amax}

NOISE LEVEL (dB)

- <= 55
- 55 - 60
- 60 - 65
- 65 - 70
- 70 - 75
- 75 - 80
- 80 - 85
- >= 85

NOT PROTECTIVELY MARKED

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DOCUMENT:
SIZEWELL C PROJECT
SHADOW HRA REPORT ADDENDUM
APPENDIX 8A
FIGURES (BASELINE)

DRAWING TITLE:
PREDICTED PEAK NOISE AT 3M ELEVATION FOR PHASE 2 CONSTRUCTION FOR SIZEWELL C BASED ON UPDATED NOISE MODELLING.

DRAWING NO:
FIGURE 8A.2

DATE:	DRAWN:	SCALE :	REVISION:
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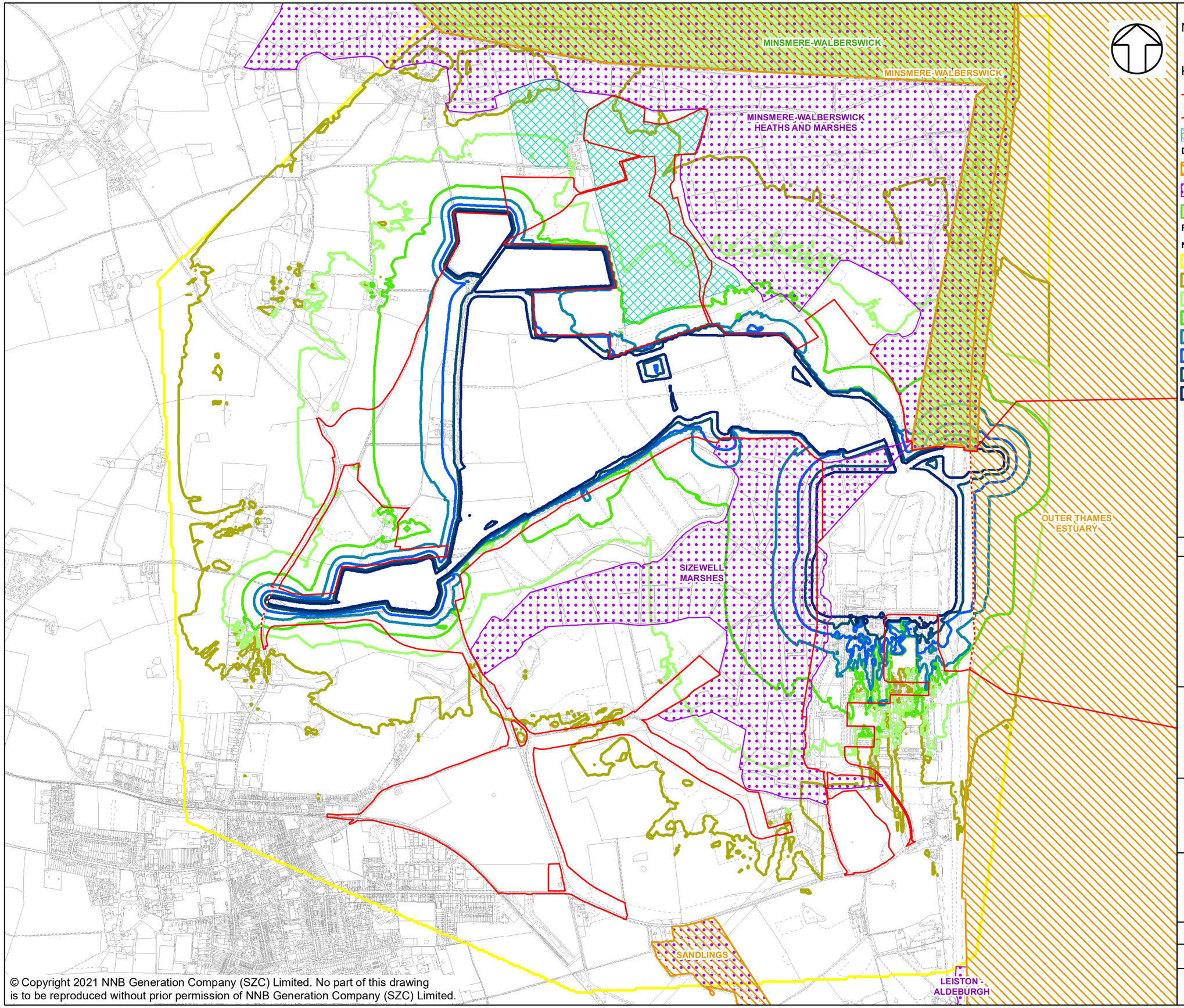

NOTES

KEY

- SIZEWELL C MAIN DEVELOPMENT SITE BOUNDARY
- DEMARCATION LINE
- HARRIER HABITAT IMPROVEMENT AREA

DESIGNATIONS

- SPECIAL PROTECTION AREA (SPA)
- SITE OF SPECIAL SCIENTIFIC INTEREST (SSSI)
- RAMSAR SITE

PHASE 3 (DAYTIME) L_{Amax}

NOISE LEVEL (dB)

- <= 55
- 55 - 60
- 60 - 65
- 65 - 70
- 70 - 75
- 75 - 80
- 80 - 85
- >= 85

NOT PROTECTIVELY MARKED

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DOCUMENT:
SIZEWELL C PROJECT
SHADOW HRA REPORT ADDENDUM
APPENDIX 8A
FIGURES (BASELINE)

DRAWING TITLE:
PREDICTED PEAK NOISE AT 3M ELEVATION FOR DAYTIME IN PHASES 3 AND 4 CONSTRUCTION FOR SIZEWELL C BASED ON UPDATED NOISE MODELLING.

DRAWING NO:
FIGURE 8A.3

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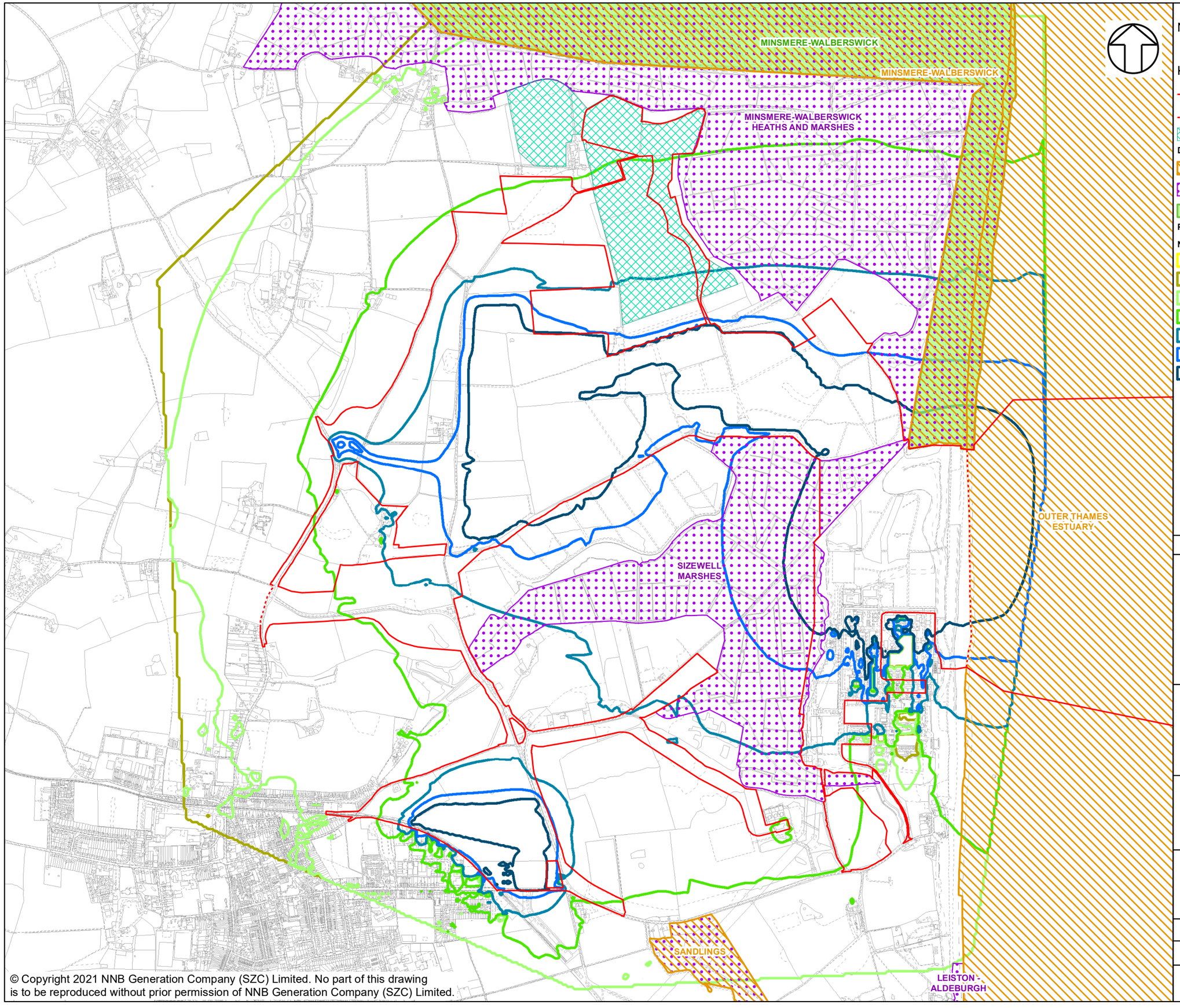

NOTES

KEY

- SIZEWELL C MAIN DEVELOPMENT SITE BOUNDARY
- DEMARCATION LINE
- HARRIER HABITAT IMPROVEMENT AREA

DESIGNATIONS

- SPECIAL PROTECTION AREA (SPA)
- SITE OF SPECIAL SCIENTIFIC INTEREST (SSSI)
- RAMSAR SITE

PHASE 3 (DAYTIME) L_{Aeq}

NOISE LEVEL (dB)

- <= 35
- 35 - 40
- 40 - 45
- 45 - 50
- 50 - 55
- 55 - 60
- >= 60

NOT PROTECTIVELY MARKED

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DOCUMENT:
SIZEWELL C PROJECT
SHADOW HRA REPORT ADDENDUM
APPENDIX 8A
FIGURES (BASELINE)

DRAWING TITLE:
PREDICTED CHRONIC NOISE AT 3M ELEVATION FOR DAYTIME IN PHASES 3 AND 4 CONSTRUCTION FOR SIZEWELL C.

DRAWING NO:
FIGURE 8A.4

DATE:	DRAWN:	SCALE :	REVISION:
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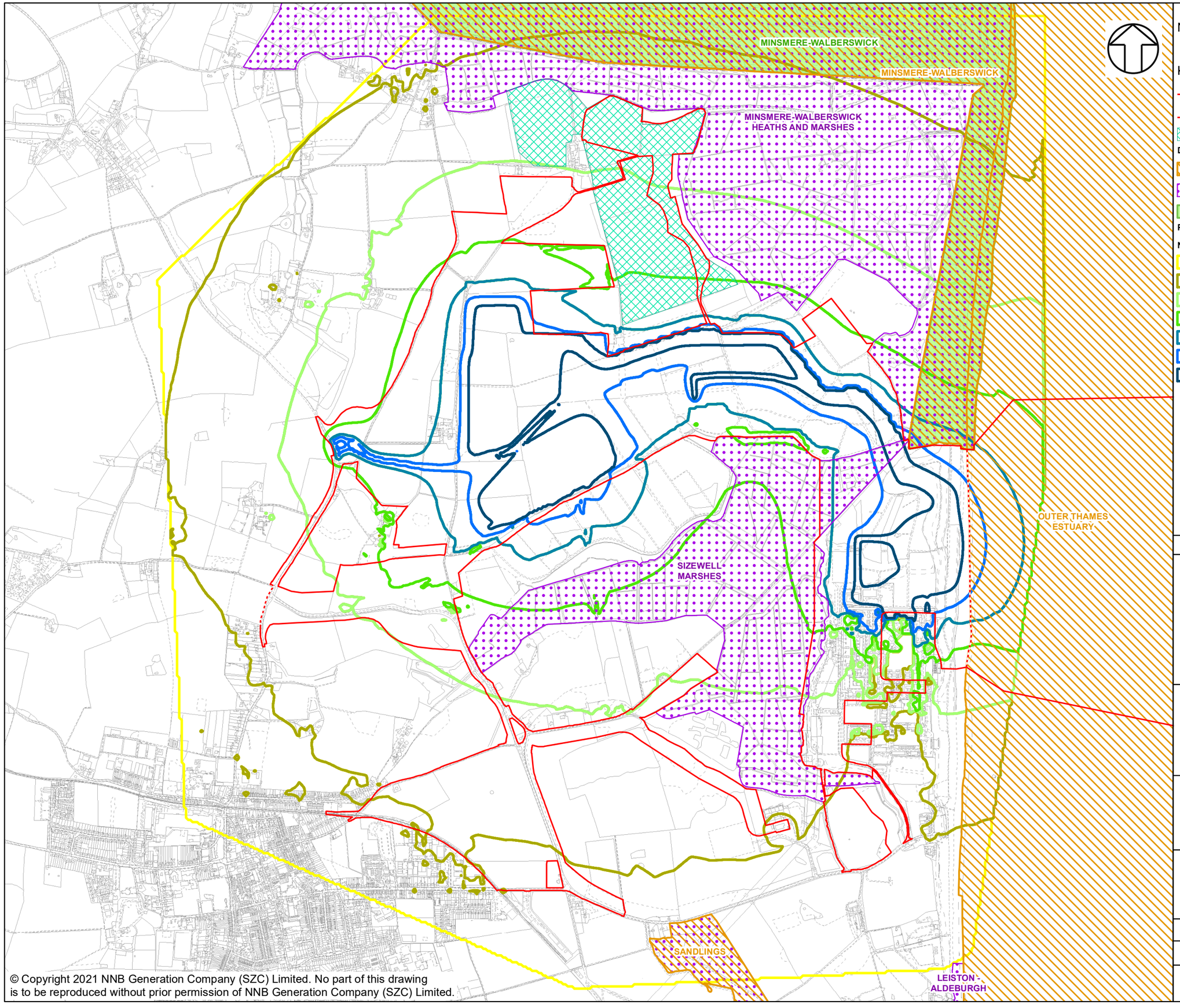

NOTES

KEY

- SIZEWELL C MAIN DEVELOPMENT SITE BOUNDARY
- DEMARCATION LINE
- HARRIER HABITAT IMPROVEMENT AREA

DESIGNATIONS

- SPECIAL PROTECTION AREA (SPA)
- SITE OF SPECIAL SCIENTIFIC INTEREST (SSSI)
- RAMSAR SITE

PHASE 3 (NIGHT-TIME) L

NOISE LEVEL (dB)

- <= 35
- 35 - 40
- 40 - 45
- 45 - 50
- 50 - 55
- 55 - 60
- >= 60

NOT PROTECTIVELY MARKED

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DOCUMENT:
SIZEWELL C PROJECT
SHADOW HRA REPORT ADDENDUM
APPENDIX 8A
FIGURES (BASELINE)

DRAWING TITLE:
PREDICTED CHRONIC NOISE AT 3M ELEVATION FOR NIGHT-TIME IN PHASES 3 AND 4 CONSTRUCTION FOR SIZEWELL C.

DRAWING NO:
FIGURE 8A.5

DATE:	DRAWN:	SCALE :	REVISION:
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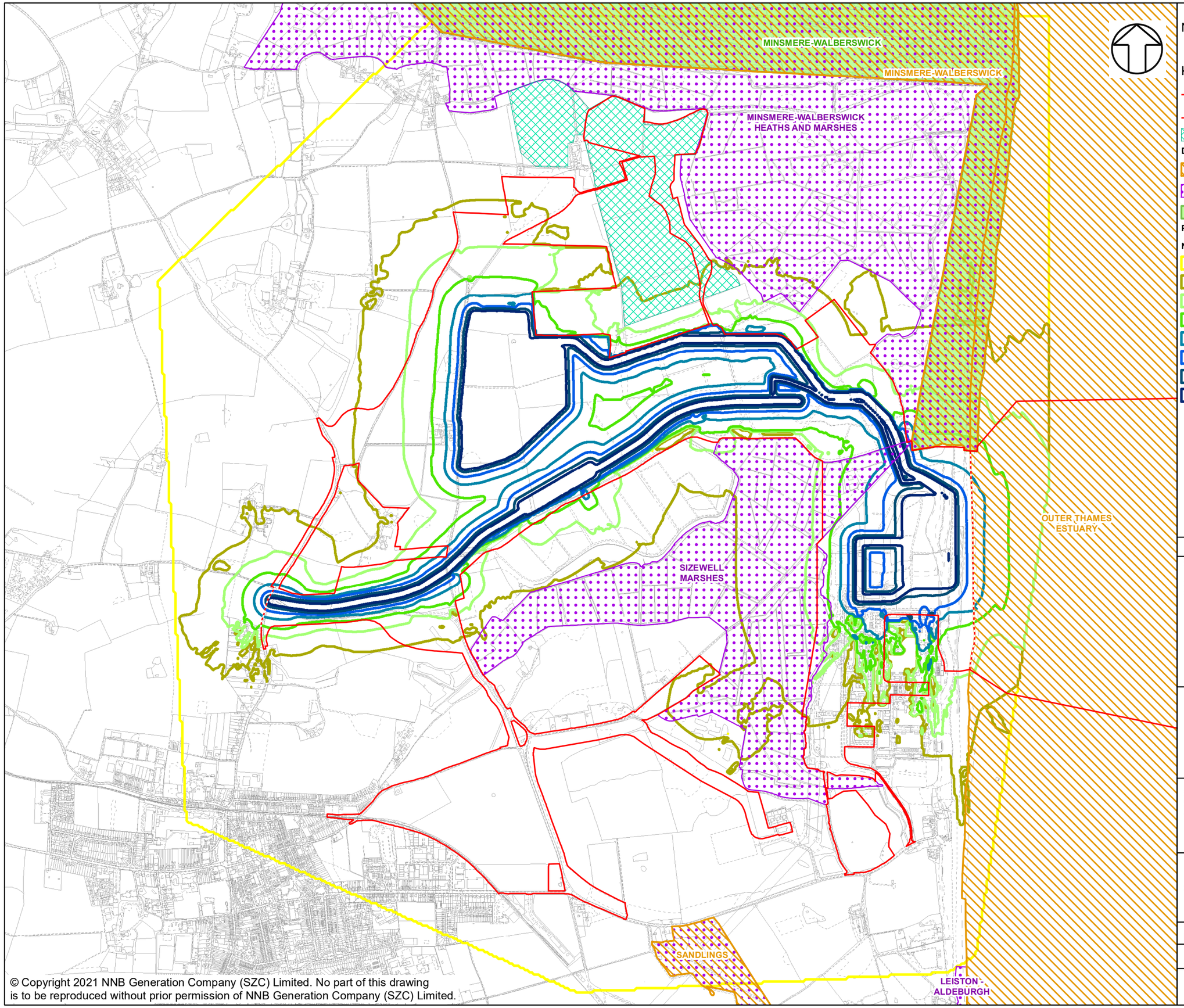

NOTES

KEY

- SIZEWELL C MAIN DEVELOPMENT SITE BOUNDARY
- DEMARCATION LINE
- HARRIER HABITAT IMPROVEMENT AREA

DESIGNATIONS

- SPECIAL PROTECTION AREA (SPA)
- SITE OF SPECIAL SCIENTIFIC INTEREST (SSSI)
- RAMSAR SITE

PHASE 3 (NIGHT-TIME) L_{Amax}

NOISE LEVEL (dB)

- <= 55
- 55 - 60
- 60 - 65
- 65 - 70
- 70 - 75
- 75 - 80
- 80 - 85
- >= 85

NOT PROTECTIVELY MARKED

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DOCUMENT:
SIZEWELL C PROJECT
SHADOW HRA REPORT ADDENDUM
APPENDIX 8A
FIGURES (BASELINE)

DRAWING TITLE:
PREDICTED PEAK NOISE AT 3M ELEVATION FOR NIGHT-TIME IN PHASES 3 AND 4 CONSTRUCTION FOR SIZEWELL C.

DRAWING NO:
FIGURE 8A.6

DATE:	DRAWN:	SCALE :	REVISION:
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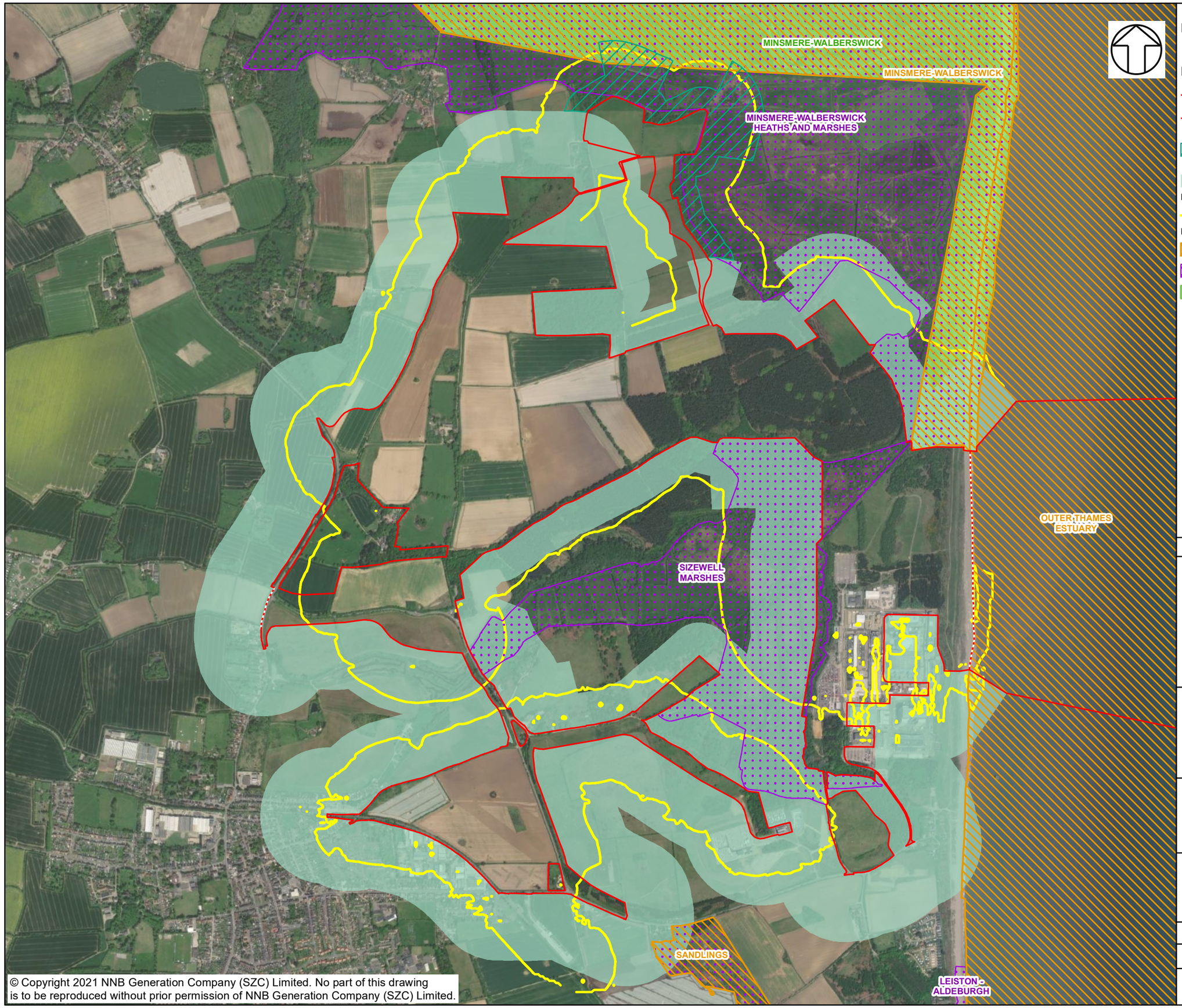

NOTES

KEY

- SIZEWELL C MAIN DEVELOPMENT SITE BOUNDARY
- DEMARCATION LINE
- VISUAL DISTURBANCE BUFFER FOR CONSTRUCTION OF THE WATER STORAGE AREA (RELEVANT TO THE FIRST WINTER OF THE CONSTRUCTION PERIOD ONLY)
- VISUAL DISTURBANCE BUFFER

PHASE 1 (DAYTIME) L_{Amax}

- 70 dB

DESIGNATIONS

- SPECIAL PROTECTION AREA (SPA)
- SITE OF SPECIAL SCIENTIFIC INTEREST (SSSI)
- RAMSAR SITE

NOT PROTECTIVELY MARKED

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SIZEWELL C PROJECT
SHADOW HRA REPORT ADDENDUM
APPENDIX 8A
FIGURES (BASELINE)

DRAWING TITLE:
THE 70DB L_{Amax} NOISE CONTOUR FOR THE WORST-CASE PREDICTION FOR THE FIRST WINTER OF PHASE 1 CONSTRUCTION (INCORPORATING THE WATER STORAGE AREA), TOGETHER WITH THE VISUAL IMPACT ZONE

DRAWING NO:
FIGURE 8A.7

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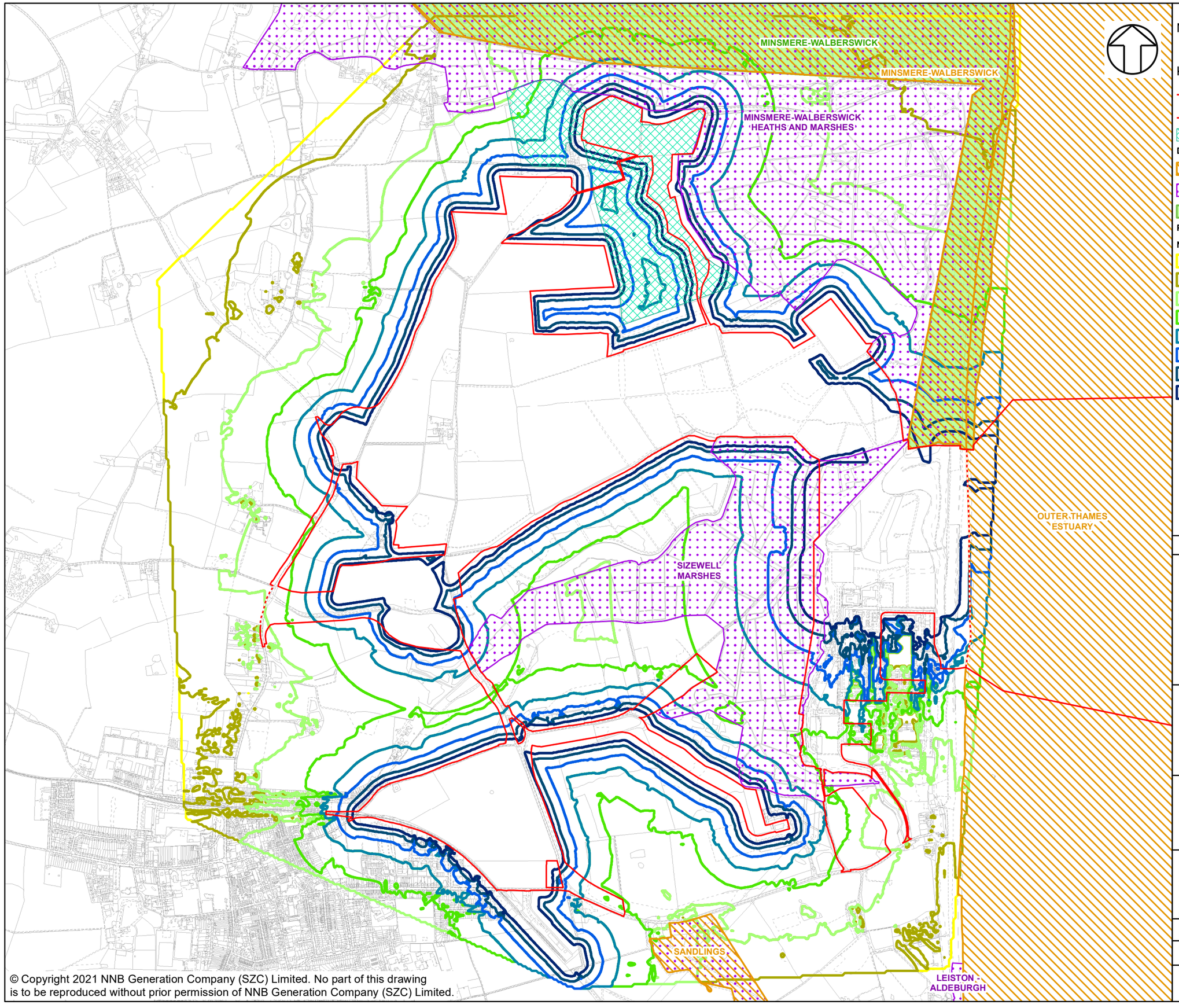

NOTES

KEY

- SIZEWELL C MAIN DEVELOPMENT SITE BOUNDARY
- DEMARCATION LINE
- HARRIER HABITAT IMPROVEMENT AREA

DESIGNATIONS

- SPECIAL PROTECTION AREA (SPA)
- SITE OF SPECIAL SCIENTIFIC INTEREST (SSSI)
- RAMSAR SITE

PHASE 1 (DAYTIME) L_{Amax}

NOISE LEVEL (dB)

- <= 55
- 55 - 60
- 60 - 65
- 65 - 70
- 70 - 75
- 75 - 80
- 80 - 85
- >= 85

NOT PROTECTIVELY MARKED

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DOCUMENT:
SIZEWELL C PROJECT
SHADOW HRA REPORT ADDENDUM
APPENDIX 8A
FIGURES (BASELINE)

DRAWING TITLE:
PREDICTED PEAK NOISE AT 3M ELEVATION FOR DAYTIME IN THE FIRST WINTER OF PHASE 1 CONSTRUCTION FOR SIZEWELL C BASED ON UPDATED NOISE MODELLING. MODELLING INCORPORATES THE CONSTRUCTION OF THE WATER STORAGE AREA DURING THE FIRST WINTER AND CONSTRUCTION OF THE SECOND BEACH LANDING FACILITY (BLF)..

DRAWING NO:
FIGURE 8A.8

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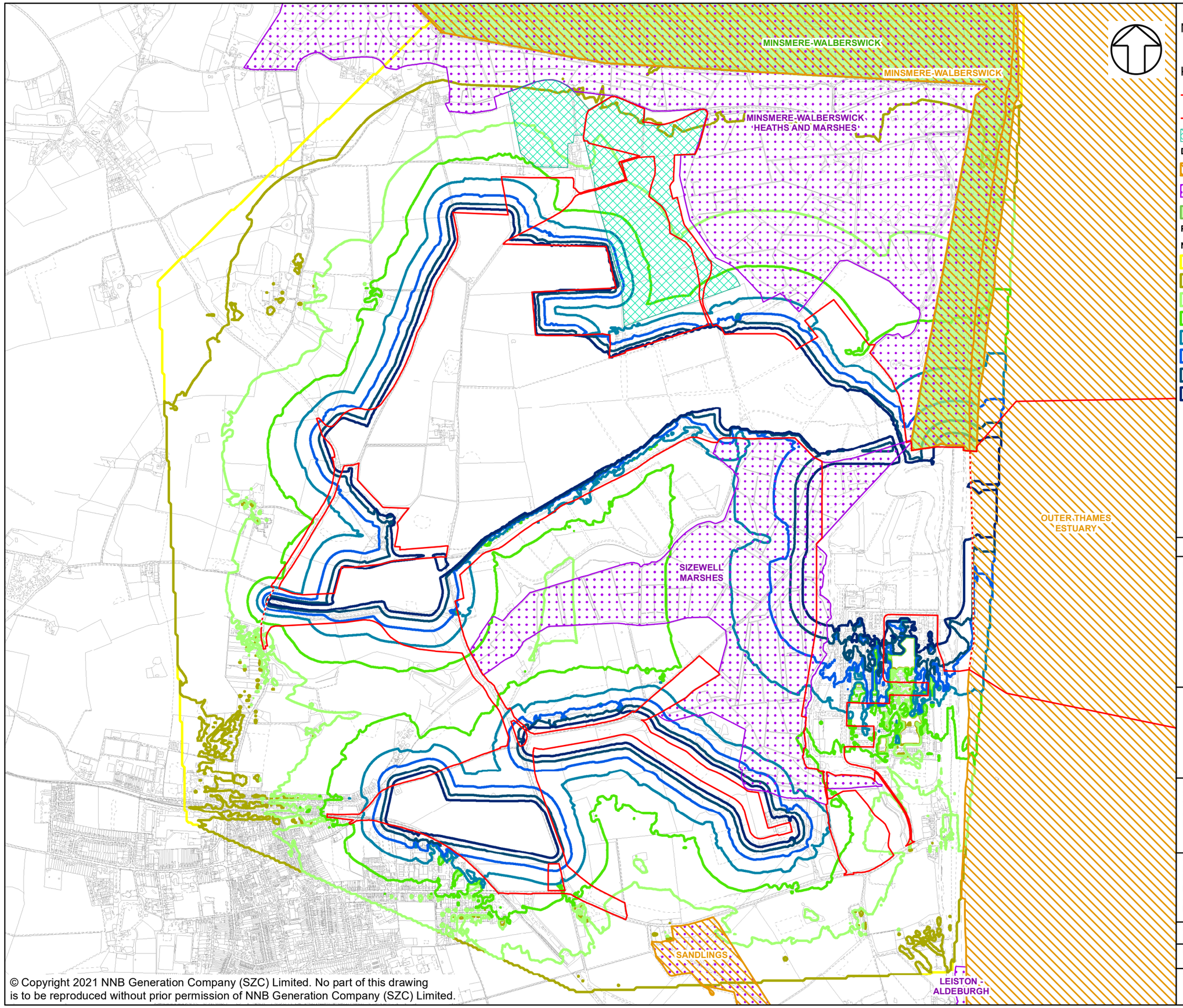

NOTES

KEY

- SIZEWELL C MAIN DEVELOPMENT SITE BOUNDARY
- DEMARCATION LINE
- HARRIER HABITAT IMPROVEMENT AREA

DESIGNATIONS

- SPECIAL PROTECTION AREA (SPA)
- SITE OF SPECIAL SCIENTIFIC INTEREST (SSSI)
- RAMSAR SITE

PHASE 2 (DAYTIME) L_{Amax}

NOISE LEVEL (dB)

- <= 55
- 55 - 60
- 60 - 65
- 65 - 70
- 70 - 75
- 75 - 80
- 80 - 85
- >= 85

NOT PROTECTIVELY MARKED

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DOCUMENT:
SIZEWELL C PROJECT
SHADOW HRA REPORT ADDENDUM
APPENDIX 8A
FIGURES (BASELINE)

DRAWING TITLE:
PREDICTED PEAK NOISE AT 3M ELEVATION FOR PHASE 2 CONSTRUCTION FOR SIZEWELL C BASED ON UPDATED NOISE MODELLING AND CONSTRUCTION OF THE SECOND BEACH LANDING FACILITY (BLF).

DRAWING NO:
FIGURE 8A.9

DATE:	DRAWN:	SCALE :	REVISION:
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SCALE BAR
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APPENDIX 9A: SOUTHERN NORTH SEA SITE INTEGRITY PLAN

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1 INTRODUCTION

1.1 Objective

1.1.1 This Site integrity Plan (SIP) for the Southern North Sea Special Area of Conservation (SNS SAC) has been produced to ensure there is no significant disturbance of harbour porpoise, *Phocoena phocoena*, as a result of underwater noise from the Sizewell C Project in-combination with other plans and projects, so that there is no potential for an adverse effect on the integrity of the SNS SAC in relation to the conservation objectives for harbour porpoise.

1.1.2 The marine works associated with the Sizewell C Project are located wholly within the winter area of the SNS SAC. The winter area of the SNS SAC (12,696km^2; **Figure 1-1**), has been recognised as an area within the SNS SAC that has high densities of harbour porpoise during the winter period (October to March, inclusive; see **section 1.3).**

1.1.3 This SIP provides the following:

- A summary of the relevant components of the Sizewell C Project in **section 1.2**.
- An overview of the SNS SAC and Conservation Objectives for harbour porpoise in **section 1.3**.
- An outline of purpose of this document and proposed consultation schedule in **section1.4**.
- A summary of the updated assessment of the potential effects of the Sizewell C Project alone and in-combination with other plans and projects (derived from the Shadow HRA Report (**Doc Ref. 5.10**)) in **section 2**.
- Mitigation and management measures in **section 3**.
- SIP summary and conclusions in **section 4**.

1.1.4 It is important to note that this SIP for the SNS SAC has been produced to ensure there is no significant disturbance of harbour porpoise as a result of underwater noise from the Sizewell C Project in-combination with other plans and projects, so that there is no potential for an adverse effect on the integrity of the SNS SAC in relation to the conservation objectives for harbour porpoise. A separate Marine Mammal Mitigation Protocol (MMMP) will be prepared (with a draft MMMP prepared as **Appendix 22N** to **Volume 2, Chapter 22** of the ES) to ensure there is no risk of auditory injury in

marine mammals as a result of underwater noise during piling. In addition, any requirements to reduce disturbance in relation to European Protected Species (EPS) will be captured through the EPS Licencing process, if required.

1.2 Project background

1.2.1 The proposed Sizewell C nuclear power station is to be located on land immediately to the north of Sizewell B nuclear power station, on the Suffolk coast approximately midway between Lowestoft to the north and Ipswich to the south.

1.2.2 The assessments in the Shadow HRA Report (**Doc Ref. 5.10**) indicate that underwater noise from the piling of the BLF could result in the greatest potential disturbance of harbour porpoise.

1.2.3 Since the completion of the Shadow HRA Report (**Doc Ref. 5.10**) in early 2020, there have been some updates for the permanent beach landing facility (BLF) and the inclusion of a proposed temporary BLF.

a) Piling of BLFs

1.2.4 The Sizewell C Project marine works include an enhanced permanent BLF for use during construction and which would be retained for operational purposes and the option for a temporary BLF for use during construction.

ii. Enhanced permanent BLF

1.2.5 The enhanced permanent BLF design is for 24 piles, with 12 piles and 4 dolphin / fenders piled below mean high water spring tide (MHWS). The pile diameter would be 1m and approximately 2.5m for dolphin / fender piles. The maximum hammer energy would be 120kJ for the piles and up to 280kJ for the dolphins / fenders piles.

1.2.6 Up to 16 piles (including dolphins / fenders) would be required to be installed for the enhanced permanent BLF in the water below MHWS. Two piles or two dolphins / fenders could be piled per day, therefore 8 days of piling would be required.

1.2.7 If it is assumed, as a worst-case, that one pile could be installed per day, piling would require 16 days. However, based on 45 minutes and 20 minute soft-start to install each pile, the total active piling time would be 17.5 hours (less than 1 day).

1.2.8 As a worst-case it is assumed that impact piling would be used, however, it is proposed to use a hydrohammer to minimise the effects of underwater noise. A hydrohammer has two hydraulic plungers filled with water

designed to dampen the impact and reduce the source noise of impact piling. Hydrohammers may reduce sound exposure levels (SEL) by 3 to 6dB and sound peak pressure level (SPL) by 9 to 12 dB.

iii. Temporary BLF

1.2.9 The temporary BLF would be approximately 505m in length and extend approximately 440m seaward of MHWS. The temporary BLF would consist of a trestle pier and an enlarged unloading platform with a single berth. The trestle pier would require 86 piles, 74 of which would be below MHWS. Piles would be approximately 1.2m in diameter and the unloading platform would consist of 32 piles with 1.2m diameter. Four mooring dolphins with a diameter of approximately 2.5m would also be installed at the unloading platform. Piling of the temporary BLF would be similar to the piling for the enhanced permanent BLF, with a maximum hammer energy of 120kJ for the piles and up to 280kJ for the dolphins / fenders piles.

1.2.10 Up to 110 piles (including dolphins / fenders) would be required to be installed for the temporary BLF in the water below MHWS. Two piles or two dolphins / fenders could be piled per day, resulting in 50 days of piling. If it is assumed, as a worst-case, that one pile could be installed per day, piling would require 110 days. However, based on 45 minutes and 20 minute soft-start to install each pile, the total active piling time would be up to 120 hours (5 days).

1.2.11 As a worst-case it is assumed that impact piling would be used, however, it is proposed to use a hydrohammer to minimise the effects of underwater noise.

iv. Permanent and temporary BLFs

1.2.1 Installation of the enhanced permanent BLF is anticipated to last six months. Installation of the temporary BLF is anticipated to last nine months.

1.2.2 Installation is assumed to start in August 2022 for both BLFs and be completed by April 2023 of the construction phase. No piling would occur in the months of May, June or July to minimise the potential for effects on designated breeding birds. Assuming no temporal overlap of piling activities, a total of 60 days piling would occur during this period, based on two piles being installed per day. If piling for the piers for the enhanced permanent BLF and temporary BLF occurred simultaneously, a total of 54 days of piling would be required.

1.2.3 It is anticipated that the temporary BLF would not progress seaward beyond the outer longshore sand bar before the enhanced permanent BLF was completed. Therefore, the worst case underwater noise

scenario for the combined effects of installation of the two BLFs would be installation of two piles per day at the enhanced permanent BLF and two piles per day within the sand bar for the temporary BLF (four piles in a 24-hour period).

1.2.4 A piling restriction to reduce the incidence of marine noise mean no additional piling would occur when mooring dolphins for the enhanced permanent BLF are installed. Therefore, the maximum duration for daily overlap between the two BLFs would be six days of piling.

b) Unexploded Ordnance (UXO) clearance

1.2.5 It has not been confirmed if any items of UXO are present in the vicinity of the marine works area, thus specific details are not currently available. If UXO is discovered at the site and alternative disposal methods or relocation are not possible, underwater detonations may be required.

1.2.6 If UXO clearance is required, further assessments will be conducted and separate licences will be prepared, including the requirements for any EPS licence. Therefore, any potential UXO clearance associated with marine works has not been included in this SIP.

1.3 The Southern North Sea SAC

a) Site information

1.3.1 The SNS SAC, designated in 2019, has been recognised as an area with persistent high densities of harbour porpoise (Ref. 1.1).

1.3.2 The SAC covers both winter and summer habitats of importance to harbour porpoise, with 27,028km^2 of the site being important in the summer (April to September) and the 12,696km^2 of the site being important in the winter period (October to March) (Ref. 1.1).

1.3.3 The majority of the SAC is less than 40m in water depth, reaching up to 75m in the northern-most areas. The seabed is mainly sublittoral sand and sublittoral coarse sediment (Ref. 1.1). The site overlaps with a number of other European sites, including the Dogger Bank SAC, Margate and Long Sands SAC, Haisborough, Hammond and Winterton SAC and North Norfolk Sandbanks and Saturn Reef SAC, all of which have important sandbank and gravel beds.

1.3.4 As a wide-ranging species, harbour porpoise within the SAC cannot be considered isolated in relation to the rest of the population. Harbour porpoise within the SAC are part of the wider North Sea Management Unit (MU) population (Ref. 1.2). JNCC and Natural England (Ref. 1.2) consider that it is therefore not appropriate to use site population estimates in

assessments, and the assessments need to take into consideration population estimates at the MU level to account for daily and seasonal movements of the animals. Currently the population estimate for the harbour porpoise North Sea MU is 345,373 (coefficient of variation = 0.52; 95% confidence interval = 246,526 - 495,752; Ref. 2.3).

1.3.5 The Sizewell C Project marine works area is located wholly within the winter area of the SAC. The winter SNS SAC area is 12,696km^2 and the winter period is October to March, inclusive (Ref. 1.4).

1.3.6 The Sizewell C Project marine works area is located 49.4km (at its closest point) from the summer area of the SNS SAC. Therefore, there is no potential for any effects on the summer area.

b) Conservation Objectives

1.3.7 The Conservation Objectives for the SNS SAC are designed to help ensure that the obligations of the Habitats Directive can be met. Article 6(2) of the Directive requires that there should be no deterioration or significant disturbance of the qualifying species or to the habitats upon which they rely.

1.3.8 The Conservation Objectives for the SAC are (Ref. 1.2):

> *"To ensure that the integrity of the site is maintained and that it makes the best possible contribution to maintaining Favourable Conservation Status (FCS) for Harbour Porpoise in UK waters*.
>
> *In the context of natural change, this will be achieved by ensuring that:*
>
> *1. Harbour porpoise is a viable component of the site;*
>
> *2. There is no significant disturbance of the species; and*
>
> *3. The condition of supporting habitats and processes, and the availability of prey is maintained".*

1.3.9 These Conservation Objectives are:

> "*a set of specified objectives that must be met to ensure that the site contributes in the best possible way to achieving Favourable Conservation Status (FCS) of the designated site feature(s) at the national and biogeographic level*" (Ref. 1.2).

Conservation Objective 1: The species is a viable component of the site.

1.3.10 This Conservation Objective is designed to minimise the risk of injury and killing or other factors that could restrict the survivability and reproductive

potential of harbour porpoise using the SAC. Specifically, this objective is primarily concerned with operations that would result in unacceptable levels of those impacts on harbour porpoise using the SAC. Unacceptable levels can be defined as those having an impact on the FCS of the populations of the species in their natural range.

1.3.11 Harbour porpoise are considered to be *a viable component* of the SAC if they are able to live successfully within it. The SNS SAC has been selected primarily based on the long-term, relatively higher densities of porpoise in contrast to other areas of the North Sea. The implication is that the SAC provides relatively good foraging habitat and may also be used for breeding and calving. However, because the number of harbour porpoise using the SAC naturally varies, there is no exact value for the number of animals expected within the site (Ref. 1.2).

1.3.12 Harbour porpoise are listed as EPS under Annex IV of the Habitats Directive, and are therefore protected from the deliberate killing (or injury), capture and disturbance throughout their range. Within the UK, the Habitats Directive is enacted through The Conservation of Habitats and Species Regulations 2017 and the Conservation of Offshore Marine Habitats and Species Regulations 2017. Under these Regulations, it is deemed an offence if harbour porpoise are deliberately disturbed in such a way as to:

1. *Impair their ability to survive, to breed or reproduce, or to rear or nurture their young; or*

2. *To affect significantly the local distribution or abundance of that species.*

1.3.13 The term deliberate is defined as any action that is shown to be "*by a person who knows, in the light of the relevant legislation that applies to the species involved, and the general information delivered to the public, that his action will most likely lead to an offence against a species, but intends this offence or, if not, consciously accepts the foreseeable results of his action"*.

1.3.14 In addition, Article 12(4) of the Habitats Directive is concerned with incidental capture and killing. It states that Member States "*shall establish a system to monitor the incidental capture and killing of the species listed on Annex IV (all cetaceans). In light of the information gathered, Member States shall take further research or conservation measures as required to ensure that incidental capture and killing does not have a significant negative impact on the species concerned"*.

Conservation Objective 2: There is no significant disturbance of the species.

1.3.15 The disturbance of harbour porpoise typically, but not exclusively, originates from operations that cause underwater noise, including activities such as seismic surveys, pile driving and sonar. Responses to noise can be physiological and/or behavioural. JNCC has produced guidelines to minimise the risk of physical injury to cetaceans from various sources of loud, underwater noise[1]. However, disturbance is primarily a behavioural response to noise and may, for example, lead to harbour porpoises being displaced from the affected area.

1.3.16 As outlined above, JNCC and Natural England (Ref. 1.2) note that harbour porpoises in UK waters are considered part of a wider European population and that due to the mobile nature of this species the concept of a 'site population' may not be appropriate for this species. JNCC (Ref. 1.1) therefore advises that assessments of effects of plans or projects (i.e. HRA) need to take into consideration population estimates at the MU level, to account for daily and seasonal movements of the animals.

1.3.17 Disturbance of harbour porpoise may lead to displacement from an area, and the temporary loss of habitat. As such, JNCC and Natural England (Ref. 1.2) suggest that activities within the SNS SAC should be managed to ensure that the animals' potential usage of the site is maintained and any disturbance should not lead to the exclusion of harbour porpoise from a significant portion of the site for a significant period of time.

1.3.18 The current Statutory Nature Conservation Bodies (SNCB) advice and guidance (Ref. 1.4) for the assessment of significant noise disturbance on harbour porpoise in the SNS SAC is that:

> *"Noise disturbance within an SAC from a plan/project, individually or in-combination, is considered to be significant if it excludes harbour porpoise from more than:*
>
> 1. *20% of the relevant area of the site in any given day, or*
> 2. *An average of 10% of the relevant area of the site over a season."*

Conservation Objective 3: The condition of supporting habitats and processes, and the availability of their prey is maintained.

1.3.19 Supporting habitats, in this context, means the characteristics of the seabed and water column. Supporting processes encompass the movements and physical properties of the habitat. The maintenance of these supporting habitats and processes contributes to ensuring prey is maintained within

[1] http://jncc.defra.gov.uk/page-4273

the SAC and is available to harbour porpoise using the site. Harbour porpoise are strongly reliant on the availability of prey species year round due to their high energy demands, and their distribution and condition may strongly reflect the availability and energy density of prey.

1.3.20 This Conservation Objective is designed to ensure that harbour porpoise are able to access food resources year round, and that activities occurring in the SNS SAC will not affect this.

c) Management measures

1.3.21 Specific management measures are yet to be developed for the SNS SAC; however, JNCC and Natural England (Ref. 1.2) advise that "*the maintenance of supporting habitats and processes contributes to ensuring that prey is maintained within the site and is available to harbour porpoises using the site*."

1.3.22 JNCC and Natural England (Ref. 1.2) also state that *"management measures (e.g. the scale and type of mitigation) are the responsibility of the relevant regulatory or management bodies. These bodies will consider SNCB advice and hold discussions with the sector concerned, where appropriate*."

1.3.23 In the absence of management measures for the SNS SAC at this time, a range of project-level commitments have been proposed through the development of this SIP, MMMP and any necessary EPS licencing requirements, to ensure that appropriate mitigation measures (where required) can be agreed to ensure that the Conservation Objectives are met.

d) Advice on activities

1.3.24 JNCC and Natural England (Ref. 1.2) have provided advice on activities that specifically occur within or near to the SNS SAC that could be expected to impact on the site's integrity. The key impacts and activities that JNCC and Natural England consider to have the greatest impact on the population of UK harbour porpoise and, therefore, the SNS SAC are:

- Removal of non-target species by commercial fisheries with by-catch of harbour porpoise (predominantly static nets).
- Increased contaminants from discharge / run-off from land fill, terrestrial and offshore industries.
- Increased anthropogenic underwater noise from shipping, drilling, dredging and disposal, aggregate extraction, pile driving, acoustic

surveys, underwater explosion, military activity, acoustic deterrent devices and recreational boating activity.

- Death or injury by collision from shipping, recreational boating and tidal energy installations.
- Reduction in prey resources by commercial fisheries.

1.3.25 The aim is that the advice should help identify the extent to which existing activities are, or can be made, consistent with the Conservation Objectives, and thereby focus the attention of relevant and competent authorities and monitoring programmes to areas that may need management measures (Ref. 1.2).

2 POTENTIAL EFFECTS: SOUTHERN NORTH SEA SAC

2.1 Potential effects of piling for the Sizewell C Project (alone)

2.1.1 The assessments in the **Shadow HRA Report** (Doc Ref. 5.10), concluded that there is no potential for adverse effect on the integrity of the SNS SAC in relation to the Conservation Objectives for harbour porpoise from the Sizewell C Project alone.

2.1.2 Since the completion of the **Shadow HRA Report** (Doc Ref. 5.10) in early 2020, there have been some updates for the enhanced permanent BLF and the inclusion of the proposed design change for a temporary BLF (as outlined in **Section 1.2**).

2.1.3 In addition, since completion of the **Shadow HRA Report** (Doc Ref. 5.10) JNCC *et al*. (Ref. 1.4) have finalised guidance for assessing the significance of noise disturbance against Conservation Objectives of harbour porpoise SACs. The guidance identifies noise generating activities that can potentially result in disturbance to harbour porpoise and provides recommended Effective Deterrence Ranges (EDR) for these activities. This includes a recommended 15km EDR for pin piles. Therefore, the assessments have been updated to take into this guidance and recommended EDR for pin piles.

2.1.4 Hydrohammers, which are proposed to be used for the piling of the BLFs, may reduce sound exposure levels (SEL) by 3 to 6dB and sound peak pressure level (SPL) by 9 to 12 dB. However, there is currently no EDR for pin-piles with noise reduction

2.1.5 Error! Reference source not found. provides an updated assessment of the potential effects of piling for the Sizewell C Project (alone) for the permanent and temporary BLFs, which shows that there is no potential for adverse effect on the integrity of the SNS SAC in relation to the Conservation Objectives for harbour porpoise from the Sizewell C Project alone.

Table 2.1: The potential effects of piling for the Sizewell C Project on the Southern North Sea SAC (alone)

Potential Effect	Assessment Of Potential Effect On Harbour Porpoise (% of North Sea MU)	Spatial Assessment In Relation To The SNS SAC Winter Area	Season Average Assessment In Relation To The SNS SAC Winter Area And Winter Season	Potential For Adverse Effect On The Integrity Of The SNC SAC
Piling at permanent BLF				
Worst-case (16 days)	202 (0.06%)	2.62% (332.5km^2)	0.23%	**No**
Likely scenario (8 days)	202 (0.06%)	2.62% (332.5km^2)	0.12%	**No**
Active piling time (1 day)	202 (0.06%)	2.62% (332.5km^2)	0.01%	**No**
Piling at temporary BLF				
Worst-case (110 days)	207 (0.06%)	2.69% (341.1km^2)	1.63%	**No**
Likely scenario (50 days)	207 (0.06%)	2.69% (341.1km^2)	0.74%	**No**
Active piling time (5 days)	207 (0.06%)	2.69% (341.1km^2)	0.07%	**No**
Consecutive piling at permanent and temporary BLFs				
Worst-case (126 days)	207 (0.06%)	2.69% (341.1km^2)	1.86%	**No**
Likely scenario (60 days)	207 (0.06%)	2.69% (341.1km^2)	0.89%	**No**
Active piling time (6 days)	207 (0.06%)	2.69% (341.1km^2)	0.09%	**No**
Concurrent piling at permanent and temporary BLFs				
Worst-case (63 days)	207 (0.06%)	2.69% (341.5km^2)	0.93%	**No**
Likely scenario (54 days)	207 (0.06%)	2.69% (341.5km^2)	0.80%	**No**
Active piling time (3 days)	207 (0.06%)	2.69% (341.5km^2)	0.04%	**No**

2.2 Potential in-combination effects during piling for the Sizewell C Project

2.2.1 Since the completion of the **Shadow HRA Report** (Doc Ref. 5.10) in early 2020, there have been some changes to the potential plans and projects that could result in in-combination underwater noise effects with Sizewell C Project marine works. This includes the Thanet Extension OWF being refused consent in June 2020 and the decision not being challenged[2]. Therefore, the in-combination assessment has been updated with the removal of the Thanet Extension OWF project.

2.2.2 In addition, since the **Shadow HRA Report** (Doc Ref. 5.10) was prepared, East Anglia ONE North, East Anglia TWO and East Anglia THREE have been combined to form the East Anglia HUB and construction is due commence in 2023. Piling is most likely to start in 2024 and, therefore, no potential for in-combination effects with piling at Sizewell C Project marine works; however, as a worst-case piling in 2023 has been considered.

2.2.3 As outlined in **Section 2.1**, since completion of the **Shadow HRA Report** (Doc Ref. 5.10) JNCC *et al*. (Ref. 1.4) have finalised guidance for assessing the significance of noise disturbance against Conservation Objectives of harbour porpoise SACs.

2.2.4 The JNCC *et al*. (Ref. 1.4) recommended EDRs are:

- 26km EDR for OWF piling of monopiles, an area of up to 2,124km^2 (up to 16.7% of SNS SAC winter area);
- 15km EDR for pin-pile piling, an area of up to 707km^2 (up to 5.6% of SNS SAC winter area);
- 15km EDR for OWF piling of monopiles with noise abatement, an area of up to 707km^2 (up to 5.6% of SNS SAC winter area);
- 15km EDR for conductor piling of oil and gas wells, an area of up to 707km^2 (up to 5.6% of SNS SAC winter area);
- 12km EDR for seismic surveys, potential area of 452.4km^2 around the moving vessel (2.5% of SNS SAC winter area); however, JNCC *et al*. (Ref. 2.4) recommends the daily disturbance footprint should be calculated using the EDR as a 'buffer' around the predicted survey line(s) that can be completed on a single day. For example, a single 10km line in a single day results in 692.4km^2 of area (5.5% of SNS SAC winter area).

[2] https://group.vattenfall.com/uk/what-we-do/our-projects/vattenfall-in-kent/thanet-extension

- 5km EDR for high resolution geophysical surveys with sub-bottom profilers, an area of 78.54km^2 around the moving vessel (0.6% of SNS SAC winter area); and

- 26km EDR for UXO clearance, an area of up to 2,124km^2 (up to 16.7% of SNS SAC winter area).

2.2.5 The in-combination assessments take this guidance and recommended EDRs for noise generating activities that could disturb harbour porpoise in the SNS SAC winter area into account. However, as previously outlined it proposed to use hydrohammer to reduce noise levels during piling of the BLFs, but there is currently no EDR for pin-piles with noise reduction methods.

2.2.6 For the **Shadow HRA Report** (Doc Ref. 5.10), a 26km disturbance range was used as a worst-case for the potential disturbance during piling of the BLF. However, JNCC *et al*. (Ref. 1.4) recommends an EDR of 15km for pin-piles (e.g. small diameter piles compared to OWF monopiles), not the 26km EDR used in the Shadow HRA. Therefore, this reduces the potential impact area from piling of the BLFs. As outlined in Error! Reference source not found.**2.1**, the maximum area for concurrent piling at permanent and temporary BLFs in the SNS SAC winter area is 341.5km^2, compared to 967km^2 assessed in the Shadow HRA.

2.2.7 Currently, the proposed piling for the permanent and temporary BLFs could be over a maximum of 126 days. However, the likely worst-case, based on the more realistic two piles per day, is up to 60 days for both BLFs. Therefore, all plans and projects in the winter area of the SNS SAC that could have in-combination effects in winter period of 2022 / 2023 have been screened in (**Appendix B**), comprising:

- OWF piling for East Anglia HUB:
  - Maximum potential overlap with SNS SAC winter area is 2,124km^2.
- UXO clearance for East Anglia HUB:
  - Maximum potential overlap with SNS SAC winter area is 2,124km^2.
- Possible operation and maintenance UXO clearance for Galloper Offshore Wind Farm:
  - Maximum potential overlap with SNS SAC winter area is 2,124km^2.

2.2.8 It is highly unlikely that two UXO campaigns and OWF piling of monopiles would be undertaken at the same time in the winter SNS SAC area during the winter period, as the maximum potential area could be up to 6,372km^2, which could result in disturbance of up to 50.2% of the SNS SAC winter area.

2.2.9 Therefore, potential in-combination scenarios have been conducted based on other potential activities that could be undertaken without exceeding 20% of the winter area of the SNS SAC on any given day during the winter period, during:

- Piling at permanent BLF – worst-case of 16 days and 8 day likely scenario (**Table** 2.2**2.2**).
- Piling at temporary BLF – worst-case of 110 days and 50 day likely scenario (**Table** 2.3**2.3**).
- Consecutive piling at permanent and temporary BLF – worst-case of 126 days and 60 day likely scenario (**Table** 2.4**2.4**).
- Concurrent piling at permanent and temporary BLF – worst-case of 63 days and 54 day likely scenario (**Table** 2.5**2.5**).

2.2.10 Not all these activities will occur at the same time in the SNS SAC winter area during the BLF piling for the Sizewell C Project; these scenarios present the possible worst-case in-combination effects, without having an adverse effect on the integrity of the SNS SAC in relation to the Conservation Objectives for harbour porpoise.

Table 2.2: Potential in-combination scenarios during piling of the permanent BLF

In-Combination Scenario For Permanent BLF	Maximum Area Of Potential Disturbance In SNS SAC Winter Area	Percentage Of SNS SAC Winter Area	Seasonal Average* During Piling For The BLF	Potential For Adverse Effect On Integrity Of The SNS SAC
Piling for the BLF (332.5km^2) with OWF monopile (2,124km^2)	2,456.5km^2	19.3%	1.70% for worst-case of 16 days (0.85% for likely scenario of 8 days)	No
Piling for the BLF (332.5km^2) with UXO	2,456.5km^2	19.3%	1.70% for worst-case of 16 days	No

In-Combination Scenario For Permanent BLF	Maximum Area Of Potential Disturbance In SNS SAC Winter Area	Percentage Of SNS SAC Winter Area	Seasonal Average* During Piling For The BLF	Potential For Adverse Effect On Integrity Of The SNS SAC
clearance (2,124km^2)			(0.85% for likely scenario of 8 days)	
Piling for the BLF (332.5km^2) with pin-piles (707km^2)	1.039.5km^2	8.2%	0.72% for worst-case of 16 days (0.36% for likely scenario of 8 days)	No
Piling for the BLF (332.5km^2) with conductor piling of oil and gas well (707km^2)	1.039.5km^2	8.2%	0.72% for worst-case of 16 days (0.36% for likely scenario of 8 days)	No
Piling for the BLF (332.5km^2) with OWF monopile with noise abatement (707km^2)	1.039.5km^2	8.2%	0.72% for worst-case of 16 days (0.36% for likely scenario of 8 days)	No
Piling for the BLF (332.5km^2) with seismic survey	784.9km^2 (based on area (452.4km^2) around vessel)	6.2%	0.54% for worst-case of 16 days (0.27% for likely scenario of 8 days)	No
	1,024.9km^2 (based on survey area (692.4km^2) in one day)	8.1%	0.71% for worst-case of 16 days (0.35% for likely scenario of 8 days)	No
Piling for the BLF (332.5km^2) with geophysical survey (78.54km^2)	411.04km^2	3.2%	0.28% for worst-case of 16 days (0.14% for likely scenario of 8 days)	No
Piling for the BLF (332.5km^2) with seismic survey	1,731.9km^2	13.6%	1.2% for worst-case of 16 days	No

In-Combination Scenario For Permanent BLF	Maximum Area Of Potential Disturbance In SNS SAC Winter Area	Percentage Of SNS SAC Winter Area	Seasonal Average* During Piling For The BLF	Potential For Adverse Effect On Integrity Of The SNS SAC
(692.4km^2) and pin-piles or conductor piling of oil and gas well or monopile with noise abatement (707km^2)			(0.6% for likely scenario of 8 days)	
Piling for the BLF (332.5km^2) with seismic survey (692.4km^2) and geophysical survey (78.54km^2) and pin-piles or conductor piling of oil and gas well or monopile with noise abatement (707km^2)	1,810.44km^2	14.3%	1.25% for worst-case of 16 days (0.63% for likely scenario of 8 days)	No
Piling for the BLF (332.5km^2) with pin-piles (707km^2) and conductor piling of oil and gas well (707km^2) and monopile with noise abatement (707km^2)	2,453.5km^2	19.3%	1.7% for worst-case of 16 days (0.85% for likely scenario of 8 days)	No

*Based on maximum, not average, area of overlap with SNS SAC winter area (12,696km^2) and winter period of 182 days from 1st October to 31st March.

Table 2.3: Potential in-combination scenarios during piling of the temporary BLF

In-Combination Scenario For Temporary BLF	Maximum Area Of Potential Disturbance In SNS SAC Winter Area	Percentage Of SNS SAC Winter Area	Seasonal Average* During Piling For The BLFs	Potential For Adverse Effect On Integrity Of The SNS SAC
Piling for the BLF (341.1km^2) with OWF monopile (2,124km^2)	2,465.1km^2	19.4%	11.74% for worst-case of 110 days (5.33% for likely scenario of 50 days)	No based on most likely scenario of 50 days
Piling for the BLF (341.1km^2) with UXO clearance (2,124km^2)	2,465.1km^2	19.4%	11.74% for worst-case of 110 days (5.33% for likely scenario of 50 days)	No based on most likely scenario of 50 days
Piling for the BLF (341.1km^2) with pin-piles (707km^2)	1.048.1km^2	8.3%	4.99% for worst-case of 110 days (2.27% for likely scenario of 50 days)	No
Piling for the BLF (341.1km^2) with conductor piling of oil and gas well (707km^2)	1.048.1km^2	8.3%	4.99% for worst-case of 110 days (2.27% for likely scenario of 50 days)	No
Piling for the BLF (341.1km^2) with OWF monopile with noise abatement (707km^2)	1.048.1km^2	8.3%	4.99% for worst-case of 110 days (2.27% for likely scenario of 50 days)	No
Piling for the BLF (341.1km^2) with seismic survey	793.5km^2 (based on area (452.4km^2) around vessel)	6.3%	3.78% for worst-case of 110 days (1.72% for likely scenario of 50 days)	No
	1,033.5km^2 (based on survey area	8.1%	4.92% for worst-case of 110 days	No

In-Combination Scenario For Temporary BLF	Maximum Area Of Potential Disturbance In SNS SAC Winter Area	Percentage Of SNS SAC Winter Area	Seasonal Average* During Piling For The BLFs	Potential For Adverse Effect On Integrity Of The SNS SAC
	(692.4km^2) in one day)		(2.24% for likely scenario of 50 days)	
Piling for the BLF (341.1km^2) with geophysical survey (78.54km^2)	419.64km^2	3.2%	2.0% for worst-case of 110 days (0.91% for likely scenario of 50 days)	No
Piling for the BLF (341.1km^2) with seismic survey (692.4km^2) and pin-piles or conductor piling of oil and gas well or monopile with noise abatement (707km^2)	1,740.5km^2	13.7%	8.29% for worst-case of 110 days (3.77% for likely scenario of 50 days)	No
Piling for the BLF (341.1km^2) with seismic survey (692.4km^2) and geophysical survey (78.54km^2) and pin-piles or conductor piling of oil and gas well or monopile with noise abatement (707km^2)	1,819.04km^2	14.3%	8.66% for worst-case of 110 days (3.94% for likely scenario of 50 days)	No
Piling for the BLF (341.1km^2) with pin-piles (707km^2) and conductor piling of oil and gas well (707km^2) and monopile with noise	2,462.1km^2	19.4%	11.72% for worst-case of 110 days (5.33% for likely scenario of 50 days)	No based on most likely scenario of 50 days

In-Combination Scenario For Temporary BLF	Maximum Area Of Potential Disturbance In SNS SAC Winter Area	Percentage Of SNS SAC Winter Area	Seasonal Average* During Piling For The BLFs	Potential For Adverse Effect On Integrity Of The SNS SAC
abatement (707km^2)				

*Based on maximum, not average, area of overlap with SNS SAC winter area (12,696km^2) and winter period of 182 days from 1st October to 31st March.

Table 2.4: Potential in-combination scenarios during consecutive piling of the permanent and temporary BLFs

In-Combination Scenario For Consecutive Piling Of BLFs	Maximum Area Of Potential Disturbance In SNS SAC Winter Area	Percentage Of SNS SAC Winter Area	Seasonal Average* During Piling For The BLFs	Potential For Adverse Effect On Integrity Of The SNS SAC
Piling for the BLF (341.1km^2) with OWF monopile (2,124km^2)	2,465.1km^2	19.4%	13.44% for worst-case of 126 days (6.40% for likely scenario of 60 days)	No based on most likely scenario of 60 days
Piling for the BLF (341.1km^2) with UXO clearance (2,124km^2)	2,465.1km^2	19.4%	13.44% for worst-case of 126 days (6.40% for likely scenario of 60 days)	No based on most likely scenario of 60 days
Piling for the BLF (341.1km^2) with pin-piles (707km^2)	1.048.1km^2	8.3%	5.72% for worst-case of 126 days (2.72% for likely scenario of 60 days)	No
Piling for the BLF (341.1km^2) with conductor piling of oil and gas well (707km^2)	1.048.1km^2	8.3%	5.72% for worst-case of 126 days (2.72% for likely scenario of 60 days)	No
Piling for the BLF (341.1km^2) with OWF monopile with noise abatement (707km^2)	1.048.1km^2	8.3%	5.72% for worst-case of 126 days (2.72% for likely scenario of 60 days)	No

In-Combination Scenario For Consecutive Piling Of BLFs	Maximum Area Of Potential Disturbance In SNS SAC Winter Area	Percentage Of SNS SAC Winter Area	Seasonal Average* During Piling For The BLFs	Potential For Adverse Effect On Integrity Of The SNS SAC
Piling for the BLF (341.1km^2) with seismic survey	793.5km^2 (based on area (452.4km^2) around vessel)	6.3%	4.33% for worst-case of 126 days (2.06% for likely scenario of 60 days)	No
	1,033.5km^2 (based on survey area (692.4km^2) in one day)	8.1%	5.64% for worst-case of 126 days (2.68% for likely scenario of 60 days)	No
Piling for the BLF (341.1km^2) with geophysical survey (78.54km^2)	419.64km^2	3.2%	2.29% for worst-case of 126 days (1.09% for likely scenario of 60 days)	No
Piling for the BLF (341.1km^2) with seismic survey (692.4km^2) and pin-piles or conductor piling of oil and gas well or monopile with noise abatement (707km^2)	1,740.5km^2	13.7%	9.49% for worst-case of 126 days (4.52% for likely scenario of 60 days)	No
Piling for the BLF (341.1km^2) with seismic survey (692.4km^2) and geophysical survey (78.54km^2) and pin-piles or conductor piling of oil and gas well or monopile with noise abatement (707km^2)	1,819.04km^2	14.3%	9.92% for worst-case of 126 days (4.72% for likely scenario of 60 days)	No

In-Combination Scenario For Consecutive Piling Of BLFs	Maximum Area Of Potential Disturbance In SNS SAC Winter Area	Percentage Of SNS SAC Winter Area	Seasonal Average* During Piling For The BLFs	Potential For Adverse Effect On Integrity Of The SNS SAC
Piling for the BLF (341.1km^2) with pin-piles (707km^2) and conductor piling of oil and gas well (707km^2) and monopile with noise abatement (707km^2)	2,462.1km^2	19.4%	13.43% for worst-case of 126 days (6.39% for likely scenario of 60 days)	No based on most likely scenario of 60 days

*Based on maximum, not average, area of overlap with SNS SAC winter area (12,696km^2) and winter period of 182 days from 1st October to 31st March.

Table 2.5: Potential in-combination scenarios during concurrent piling of the permanent and temporary BLFs

In-Combination Scenario For Concurrent Piling Of BLFs	Maximum Area Of Potential Disturbance In SNS SAC Winter Area	Percentage Of SNS SAC Winter Area	Seasonal Average* During Piling For The BLFs	Potential For Adverse Effect On Integrity Of The SNS SAC
Piling for the BLF (341.5km^2) with OWF monopile (2,124km^2)	2,465.5km^2	19.4%	6.72% for worst-case of 63 days (5.76% for likely scenario of 54 days)	No
Piling for the BLF (341.5km^2) with UXO clearance (2,124km^2)	2,465.5km^2	19.4%	6.72% for worst-case of 63 days (5.76% for likely scenario of 54 days)	No
Piling for the BLF (341.5km^2) with pin-piles (707km^2)	1.048.5km^2	8.3%	2.86% for worst-case of 63 days (2.45% for likely scenario of 54 days)	No
Piling for the BLF (341.5km^2) with conductor piling of oil and	1.048.5km^2	8.3%	2.86% for worst-case of 63 days	No

In-Combination Scenario For Concurrent Piling Of BLFs	Maximum Area Of Potential Disturbance In SNS SAC Winter Area	Percentage Of SNS SAC Winter Area	Seasonal Average* During Piling For The BLFs	Potential For Adverse Effect On Integrity Of The SNS SAC
gas well (707km^2)			(2.45% for likely scenario of 54 days)	
Piling for the BLF (341.5km^2) with OWF monopile with noise abatement (707km^2)	1.048.5km^2	8.3%	2.86% for worst-case of 63 days (2.45% for likely scenario of 54 days)	No
Piling for the BLF (341.5km^2) with seismic survey	793.9km^2 (based on area (452.4km^2) around vessel)	6.3%	2.16% for worst-case of 63 days (1.86% for likely scenario of 54 days)	No
	1,033.9km^2 (based on survey area (692.4km^2) in one day)	8.1%	2.82% for worst-case of 63 days (2.42% for likely scenario of 54 days)	No
Piling for the BLF (341.5km^2) with geophysical survey (78.54km^2)	420.04km^2	3.3%	1.15% for worst-case of 63 days (0.98% for likely scenario of 54 days)	No
Piling for the BLF (341.5km^2) with seismic survey (692.4km^2) and pin-piles or conductor piling of oil and gas well or monopile with noise abatement (707km^2)	1,740.9km^2	13.7%	4.75% for worst-case of 63 days (4.07% for likely scenario of 54 days)	No
Piling for the BLF (341.5km^2) with seismic survey (692.4km^2) and	1,819.44km^2	14.3%	4.96% for worst-case of 63 days	No

In-Combination Scenario For Concurrent Piling Of BLFs	Maximum Area Of Potential Disturbance In SNS SAC Winter Area	Percentage Of SNS SAC Winter Area	Seasonal Average* During Piling For The BLFs	Potential For Adverse Effect On Integrity Of The SNS SAC
geophysical survey (78.54km^2) and pin-piles or conductor piling of oil and gas well or monopile with noise abatement (707km^2)			(4.25% for likely scenario of 54 days)	
Piling for the BLF (341.5km^2) with pin-piles (707km^2) and conductor piling of oil and gas well (707km^2) and monopile with noise abatement (707km^2)	2,462.5km^2	19.4%	6.71% for worst-case of 63 days (5.75% for likely scenario of 54 days)	No

*Based on maximum, not average, area of overlap with SNS SAC winter area (12,696km^2) and winter period of 182 days from 1st October to 31st March.

3 SIP MITIGATION AND MANAGEMENT

3.1.1 As a worst-case it is assumed that impact piling would be used, however, it is proposed to use a hydrohammer to minimise the effects of underwater noise. Hydrohammers may reduce sound exposure levels (SEL) by 3 to 6dB and sound peak pressure level (SPL) by 9 to 12 dB.

3.1.2 The in-combination scenarios assessed in **Section 2.2** indicate that based on the worst-case and / or likely scenario for impact piling of the permanent and / or temporary BLFs that there is no potential for adverse effect on the integrity of the SNS SAC in relation to the Conservation Objectives for harbour porpoise during piling for the Sizewell C Project. Therefore, no mitigation or management measures are required.

4 SUMMARY AND CONCLUSION

4.1.1 This SIP shows that the most likely in-combination scenarios, based on impact piling, will not have an adverse effect on the integrity of the SNS SAC (**Section 2.2**). It is proposed to use a hydrohammer to reduce noise levels during piling of the BLFs, as such no further mitigation measures are required during piling of the BLFs.

REFERENCES

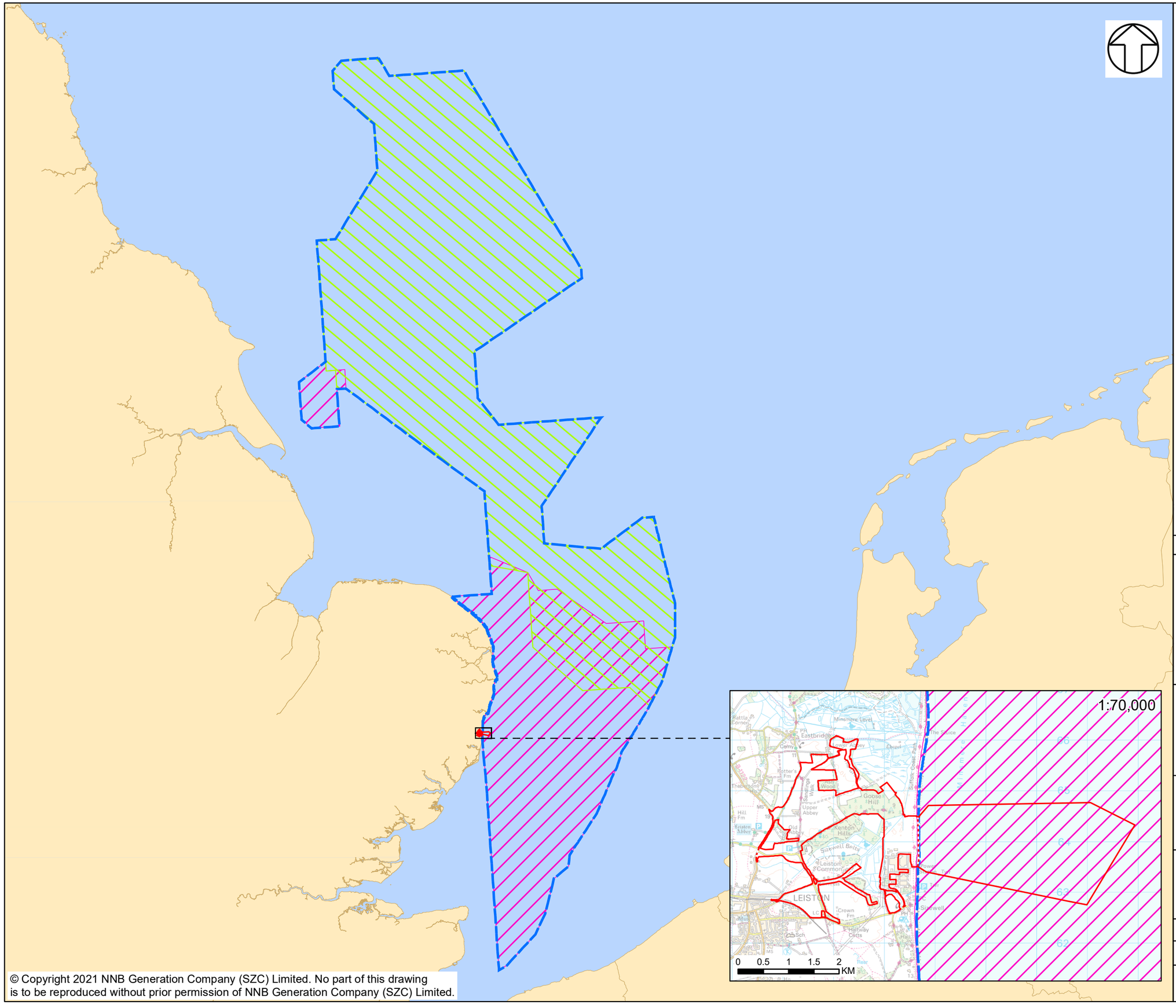
Ref. 1.1 JNCC. SAC Selection Assessment: Southern North Sea. January 2017. Joint Nature Conservation Committee, UK. Available from: http://jncc.defra.gov.uk/page-7243. 2017.

Ref. 1.2 JNCC and Natural England. Harbour Porpoise (*Phocoena phocoena*) Special Area of Conservation: Southern North Sea Conservation Objectives and Advice on Operations. Advice under Regulation 21 of The Conservation of Offshore Marine Habitats and Species Regulation 2017 and Regulation 37(3) of the Conservation of Habitats and Species Regulations 2017. March 2019.

Ref. 1.3 Hammond, P.S., Lacey, C., Gilles, A., Viquerat, S., Boerjesson, P., Herr, H., Macleod, K., Ridoux, V., Santos, M., Scheidat, M. and Teilmann, J. Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys. Wageningen Marine Research. 2017.

Ref. 1.4 JNCC, Department of Agriculture, Environment and Rural Affairs (DAERA) and Natural England. Guidance for assessing the significance of noise disturbance against Conservation Objectives of harbour porpoise SACs (England, Wales & Northern Ireland). June 2020.

APPENDIX A: FIGURE 1.1



NOTES

KEY

- SIZEWELL C MAIN DEVELOPMENT SITE BOUNDARY
- DEMARCATION LINE
- SOUTHERN NORTH SEA SPECIAL AREA OF CONSERVATION (SAC)
- SUMMER AREA
- WINTER AREA

NOT PROTECTIVELY MARKED

SizewellC
Doing the power of good for Britain
EDF CGN

DOCUMENT:
SITE INTEGRITY PLAN FOR THE SOUTHERN NORTH SEA SPECIAL AREA OF CONSERVATION

DRAWING TITLE:
SIZEWELL C IN RELATION TO THE SOUTHERN NORTH SEA SAC WINTER AND SUMMER AREAS

DRAWING NO:
FIGURE 1.1

DATE:	DRAWN:	SCALE :	REVISION:
JAN 2021	J.T.	1:1,900,000 @A3	2.0

SCALE BAR
0 10 20 30 40 50
Kilometres

APPENDIX B: SZC PILING AND OWF PILING AND UXO DATES

Table B1: Offshore wind farms within 26km of the SNS SAC winter area considered in the in-combination assessments for the potential disturbance of harbour porpoise where there is the potential of UXO or piling occurring at the same time as piling at the SZC BLF(s). All details presented are based on the most up to date information for each project at the time of writing.

Name Of Project	Distance From SNS SAC Winter Area	Possible UXO Dates*	Dates Of Offshore Piling[1]	Potential For UXO During SZC Piling	Potential For Piling[2] Occurring At The Same Time As SZC Piling
SZC BLFs Piling	**Within SNS SAC Winter Area**	**N/A**	**Winter 2022/2023**	No	**Possible Concurrent Piling At Two BLFs**
Tier 3: consented					
Dogger Bank A	No overlap with winter area	2021	2022-2023	N/A – no overlap with winter area	N/A – no overlap with winter area
Dogger Bank B	No overlap with winter area	2021 or 2022	2023	N/A – no overlap with winter area	N/A – no overlap with winter area
Dogger Bank C	No overlap with winter area	2023	2024	N/A – no overlap with winter area	N/A – no overlap with winter area
Sofia	**Within SNS SAC summer area**	2021-2022	Offshore construction to commence in 2023	N/A – no overlap with winter area	N/A – no overlap with winter area
East Anglia THREE[3]	**Within SNS SAC summer area**	2022	Offshore construction to commence in 2023 (although piling likely	**Yes**	**Yes**[3]

Name Of Project	Distance From SNS SAC Winter Area	Possible UXO Dates*	Dates Of Offshore Piling[1]	Potential For UXO During SZC Piling	Potential For Piling[2] Occurring At The Same Time As SZC Piling
SZC BLFs Piling	**Within SNS SAC Winter Area**	**N/A**	**Winter 2022/2023**	No	**Possible Concurrent Piling At Two BLFs**
			to begin in summer 2023 or 2024)		
Hornsea Project Two	**Within SNS SAC summer area**	2020	2020-2021	N/A – no overlap with winter area	N/A – no overlap with winter area
Triton Knoll phase 1-3	**Less than 26km**	2019/20	2020	No	No
Norfolk Vanguard	**Within SNS SAC summer area**	2023	2024 – 2028	No	No
Tier 4: application submitted					
Hornsea Project Three	**Less than 26km**	2022	Possible piling: 2022-2023 and 2029-2030	N/A – no overlap with winter area	N/A – no overlap with winter area
Norfolk Boreas	**Within SNS SAC summer area**	2024	2025 – 2029	No	No
East Anglia ONE North	**Within SNS SAC summer area**	2022	Offshore construction to commence in 2023	Part of East Anglia Hub and same	Part of East Anglia Hub and same campaign as EA3 above[3]

Name Of Project	Distance From SNS SAC Winter Area	Possible UXO Dates*	Dates Of Offshore Piling[1]	Potential For UXO During SZC Piling	Potential For Piling[2] Occurring At The Same Time As SZC Piling
SZC BLFs Piling	**Within SNS SAC Winter Area**	**N/A**	**Winter 2022/2023**	No	**Possible Concurrent Piling At Two BLFs**
East Anglia TWO	**Less than 26km**	2022	Offshore construction to commence in 2023	campaign as EA3 above[3]	
Tier 5: application in preparation					
Hornsea Project Four	**Within SNS SAC summer area**	Unknown	Unknown	N/A – no overlap with winter area	N/A – no overlap with winter area
Dudgeon and Sheringham Shoal Extensions	**Less than 26km**	Unknown	Unknown	No	No
Operation and Maintenance UXO					
Galloper[4]	**Less than 26km**	Unknown	Unknown	**Yes**	No

*Possible UXO clearance dates assumed to be 1 year before piling, unless other information is available

[1]Piling and offshore construction dates are based on the latest dates and information available.

[2]Most likely worst-case scenario: projects for which consent has been granted (Tier 3 projects), applications have been submitted (Tier 4) and proposed piling is likely to overlap with the proposed piling of SZC.

[3]The proposed East Anglia Hub, which consists of the East Anglia THREE, East Anglia TWO and East Anglia ONE North offshore wind farms, offshore construction activity, including piling, is proposed to commence in 2023, UXO clearance is assumed to be 2022 and would be one campaign for the three sites or subsequent UXO clearance of the three sites, therefore only potential for one UXO clearance operation at a time. https://www.scottishpowerrenewables.com/pages/east_anglia_timeline.aspx

[4]Galloper Offshore Wind Farm Ltd has applied for a license for any UXO clearance that may be required during operation and maintenance.

APPENDIX 10A: INTEGRITY MATRICES

Habitats Regulations Assessment

Appendix D1: Planning Inspectorate HRA Integrity Matrices for SACs

STAGE 2: EFFECTS ON INTEGRITY

Likely **significant** effects have been identified for the following sites:

- Alde-Ore and Butley Estuaries SAC
- Benacre to Easton Bavents Lagoons SAC
- Dew's Ponds SAC
- Humber Estuary SAC
- Minsmere to Walberswick Heaths and Marshes SAC
- Orfordness to Shingle Street SAC
- Southern North Sea SAC
- The Wash and North Norfolk Coast SAC
- Schelde- en Durmeëstuarium van de Nederlandse grens tot Gent SCI
- Unterweser SCI
- Weser bei Bremerhaven SCI
- Nebenarme der Weser mit Strohauser Plate und Juliusplate SCI
- Schleswig-Holsteinisches Elbästuar und angrenzende Flächen SCI
- Unterelbe SCI
- Mühlenberger Loch/Neßsand SCI
- Rapfenschutzgebiet Hamburger Stromelbe SCI
- Hamburger Unterelbe SCI
- Elbe zwischen Geesthacht und Hamburg SCI
- Marais du Cotentin et du Bessin - Baie des Veys SAC
- Tregor Goëlo SAC
- Havre de Saint-Germain-sur-Ay et Landes de Lessay SAC
- Marais Vernier, Risle Maritime SAC
- Treene Winderatter See bis Friedrichstadt und Bollingstedter Au SAC
- Untereider SAC
- Lesum SAC
- Bremische Ochtum SAC

- Weser zwischen Ochtummündung und Rekum SAC
- Unterems und Außenems SCI
- Ems SCI

These sites have been subject to further assessment in order to establish if the nationally significant infrastructure project (NSIP) could have an adverse effect on their integrity. Evidence for the conclusions reached on integrity is detailed within the footnotes to the matrices below.

Matrix Key

✓ **=** Adverse effect on integrity **cannot** be excluded
× **=** Adverse effect on integrity **can** be excluded

C = construction
O = operation
D = decommissioning

Where effects are not relevant to a particular feature the matrix cell has been formatted as follows:

HRA Integrity Matrix D1.1: Alde-Ore and Butley Estuaries SAC

Name of European site and designation: Alde-Ore and Butley Estuaries SAC																		
EU Code: UK0030076																		
Distance to NSIP: 6.5 km																		
European site features	**Adverse effect on integrity**																	
Effect	Alteration of coastal processes / sediment transport			Water quality effects – marine environment			Water quality effects – terrestrial environment			Alteration of local hydrology and hydrogeology			Changes in air quality			In combination effects		
Stage of Development	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*
1130 Estuaries	x **a**	x **a**	x **a**		x **b**		x **c**			x **d**	x **d**		x **e**	x **f**	x **e**		x **g**	
1140 Mudflats and sandflats not covered by seawater at low tide	x **a**	x **a**	x **a**		x **d**		x **c**			x **d**	x **d**		x **e**	x **f**	x **e**		x **g**	
1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	x **a**	x **a**	x **a**		x **d**		x **c**			x **d**	x **d**		x **e**	x **f**	x **e**		x **g**	

a. Alteration of coastal processes/sediment transport: The changes in tidal currents, waves and sediment transport would be confined to the local area around the sources of disturbance and there would be no change to coastal processes and sediment transport of the 'estuaries', 'mudflats and sandflats' and 'Atlantic salt meadows' qualifying features. Suspended sediment concentrations (SSCs) from dredging would reduce to background levels within four days after

dredging ceases (see **section 7.3 and 7.4 b i**) (**Doc Ref 5.10**). It is, therefore, concluded that the construction, operation and decommissioning activities of the Sizewell C Project would not adversely affect the integrity of the Alde, Ore and Butley Estuaries SAC from changes to coastal processes and sediment transport.

b. Water quality effects – marine environment: Marine and coastal habitats could be affected by changes in water quality during the operational phase due to discharge activities from the cooling water system, with respect to the thermal, chemical and moribund biota discharges. Hydrodynamic modelling has demonstrated that the extent of the Sizewell C thermal and chemical plumes do not intersect with the SAC (see **section 7.4 b ii**) (**Doc Ref 5.10**).

The waters off Sizewell C are well mixed vertically, facilitating reaeration at the surface, background dissolved oxygen levels are high, and the water exchange rate of the Greater Sizewell Bay is enough to limit the extent and duration of any oxygen reduction from the input loading of BOD from biomass discharged from the fish return system (i.e. dead fish). (see **section 7.4 b ii**) (**Doc Ref 5.10**).

It is, therefore, concluded that the operational activities of the Sizewell C Project would not adversely affect the integrity of the Alde, Ore and Butley Estuaries SAC due to changes in marine water quality.

c. Water quality effects – terrestrial environment: During screening it was identified that the construction of the Two Village Bypass could have **significant** effect on the River Alde. The construction of the crossing would be carried out in line with the Code of Construction Practice (CoCP). The CoCP would be informed by relevant environmental legislative requirements and comply with current standards, construction and operational experience and the commitments of the EIA process; securing mitigation measures that are not secured by any other means. Excavated materials generally would not be stored in areas of high flood risk to avoid sediment loss during flooding. This mitigation would ensure that there is no significant impact on the water quality of the River Alde associated with the construction of the bridge (see **section 7.4 b iii**) (**Doc Ref 5.10**). It is, therefore, concluded that the construction activities of the Sizewell C Project would not adversely affect the integrity of the Alde, Ore and Butley Estuaries SAC from changes to terrestrial water quality.

d. Alteration of local hydrology and hydrogeology: During screening it was identified that the construction and operation of the Two Village Bypass could have **significant** effect on the River Alde. A buffer distance of at least 10 m would be maintained during construction and operation of the crossing from the toe of the bank of the River Alde and adjoining ditches, where feasible, to protect the integrity of the banks as well as the associated ecological features. The design of the crossing is such that there would be no direct disturbance to the river (see **section 7.4 b iv**) (**Doc Ref 5.10**). Based on the design of the crossing and the embedded mitigation proposed, an effect on hydrological processes from its construction and operation on the Alde, Ore and Butley Estuaries SAC is not predicted.

e. **Changes in air quality:** The study area for the assessment of dust impacts during construction is based on the criteria detailed in the Institute of Air Quality Management (IAQM) guidance. The IAQM guidance states that ecological receptors within 50 m of potential dust sources, 50 m of the routes used by construction vehicles on the public highway and within 500 m of construction site access require assessment; beyond these distances, dust effects from construction activities can be expected to be negligible. Hence the Alde, Ore and Butley Estuaries SAC falls beyond the study area for the assessment of dust emissions and no further consideration of construction or decommissioning dust is necessary (see **section 7.4 b v**) (Doc Ref 5.10).

f. **Changes in air quality:** The modelling of the combustion scenarios as reported in **Environmental Statement** (**ES) Volume 2, Chapter 12:** air quality, predicts that for NOx (long-term) and NOx (short-term), the Process Contribution (PC) would be 0.2% and 7% of the Critical Level respectively and, therefore, **not significant**. For SO_2 (long-term), the PC would be 0% of the Critical Level and, therefore, **not significant**. From this, it can be concluded that the Critical Level would not be exceeded for the qualifying features of the Alde, Ore and Butley Estuaries SAC. In addition, the Critical Load for nutrient nitrogen deposition would not be exceeded, with the PC predicted to be 0.03% of the Critical Load. On the basis of these predictions, it is concluded that there would not be an adverse effect on the integrity of these qualifying features due to changes in air quality during the operational phase (see **section 7.4 b v**) (Doc Ref 5.10).

g. **In-combination effects:** The screening process identified one other plan/project that could have an in-combination effect with the qualifying features of the SAC: Suffolk Shoreline management Plan (SMP7). Given the proposed management approaches outlined within the preliminary assessment of the SMP, none of them have the potential to cause an in-combination effect with the construction, commissioning, operational and decommissioning activities of the Sizewell C Project (see **section 7.4 e**) (Doc Ref 5.10). Therefore, it is predicted that an in-combination effect on coastal processes and water quality would not arise due to the Sizewell C Project and the outcomes of the Suffolk SMP.

HRA Integrity Matrix D1.2: Benacre to Easton Bavents Lagoons SAC

Name of European site and designation: Benacre to Easton Bavents Lagoons SAC									
EU Code: UK0013104									
Distance to NSIP: 14.6 km									
European site features	**Adverse effect on integrity**								
Effect	Alteration of coastal processes / sediment transport			Water quality effects – marine environment			In-combination		
Stage of Development	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*
1150 Coastal lagoons * Priority feature	x **a**	x **a**	x **a**		x **b**		x **c**	x **c**	x **c**

a. Alteration of coastal processes/sediment transport: The changes in tidal currents, waves and sediment transport would be confined to the local area around the sources of disturbance and there would be no change to coastal processes and sediment transport of the coastal lagoons qualifying features. Suspended sediment concentrations (SSCs) from dredging would reduce to background levels within four days after dredging ceases (see **section 7.3 and 7.5 b i**) (**Doc Ref 5.10**). It is, therefore, concluded that the construction, operation and decommissioning activities of the Sizewell C Project would not adversely affect the integrity of the Benacre to Easton Bavents Lagoons SAC from changes to coastal processes and sediment transport.

b. Water quality effects – marine environment: Marine and coastal habitats could be affected by changes in water quality during the operational phase due to discharge activities from the cooling water system, with respect to the thermal, chemical and moribund biota discharges. Hydrodynamic modelling has demonstrated that the extent of the Sizewell C thermal and chemical plumes do not intersect with the SAC (see **section 7.5 b ii**) (Doc Ref 5.10).

The waters off Sizewell C are well mixed vertically, facilitating reaeration at the surface, background dissolved oxygen levels are high, and the water exchange rate of the Greater Sizewell Bay is enough to limit the extent and duration of any oxygen reduction from the input loading of BOD from biomass discharged from the fish return system (i.e. dead fish). This is predicted to have a negligible effect on water quality (see **section 7.5 b ii**) (Doc Ref 5.10).

It is, therefore, concluded that the operation activities of the Sizewell C Project would not adversely affect the integrity of Benacre to Easton Bavents Lagoons SAC from changes to marine water quality.

c. **In-combination effects:** The screening process identified one other plan/project that could have an in-combination effect with the qualifying features of the SAC: Suffolk Shoreline management Plan (SMP7). Given the proposed management approaches outlined within the preliminary assessment of the SMP, none of them have the potential to cause an in-combination effect with the construction, commissioning, operational and decommissioning activities of the Sizewell C Project (see **section 7.5 d**) (Doc Ref 5.10). Therefore, it is predicted that an in-combination effect on water quality would not arise due to the Sizewell C Project and the outcomes of the Suffolk SMP.

HRA Integrity Matrix D1.3: Dew's Ponds SAC

Name of European site and designation: Dew's Ponds SAC						
EU Code: UK0030133						
Distance to NSIP: 11.2 km						
European site features	**Adverse effect on integrity**					
Effect	Alteration of local hydrology and hydrogeology			In-combination		
Stage of Development	*C*	*O*	*D*	*C*	*O*	*D*
1166 Great crested newt *Triturus cristatus*	x **a**	x **a**	x **a**			

a. Alteration of local hydrology and hydrogeology: During the screening stage it was identified that there was the potential for the Northern Park and Ride to alter the local hydrology and hydrogeology of the area on which Dew's Ponds SAC is dependent, which could affect the great crested newts qualifying feature. As the SAC is located within a different hydrological catchment to the park and ride, there is no hydrological connectivity of surface waters between the Northern Park and Ride and the SAC. Additionally, **no significant** effects on the groundwater of the two catchments are predicted due to the proposed park and ride (**ES Volume 3, Chapter 12**). Therefore, it can be concluded that an adverse effect on great crested newts would not arise from the construction, operation or decommissioning of the Northern Park and Ride due to potential changes in hydrology and hydrogeological conditions (see **section 7.6 b i**) (Doc Ref 5.10).

HRA Integrity Matrix D1.4: Humber Estuary SAC

Name of European site and designation: Humber Estuary SAC												
EU Code: UK0030170												
Distance to NSIP: 162.9 km												
European site features	**Adverse effect on integrity**											
Effect	Water quality effects – marine environment			Disturbance effects on species populations			Physical interaction between species and project infrastructure			In-combination		
Stage of Development	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*
1095 Sea lamprey *Petromyzon marinus*								x **f**				
1099 River lamprey *Lampetra fluviatilis*								x **f**				
1364 Grey seal *Halichoerus grypus*	x **a**	x **b**	x **a**	x **c**		x **c**	x **d**	x **e**	x **d**	x **g**	x **g**	x **g**

a. Water quality effects – marine environment: With respect to marine water quality, the largest area of effect on foraging grey seal is predicted to occur during operation (from the total residual oxidants (TRO) plume for both Sizewell B and C in-combination, affecting an area of 7.26 km^2). For assessing the potential effect of construction and decommissioning on marine water quality, as a precautionary approach, the number of grey seal that potentially could be present (and percentage of the reference population) within this area of effect has been estimated. The total number of foraging grey seal that could be present in the affected area is 0.3 individuals; this represents up to 0.003% of the reference population (or up to 0.005% of the estimated Humber Estuary SAC population) (see **section 9.4 a i**) (Doc Ref 5.10).

The number of foraging grey seal that could be present (and percentage of the reference population) in the area from which prey species could be impacted, as a result of any changes to water quality, has been estimated based on the maximum area of effect of 7.26 km^2. As the maximum predicted impact area for any increased suspended sediments and contaminant re-mobilisation is the same for foraging grey seal as it is for their prey, there would be no additional impacts on foraging grey seal as a result of the effects of any changes to water quality on prey species within the construction or decommissioning phases (see **section 9.4 a i**) (Doc Ref 5.10).

Therefore, no adverse effects on the integrity of the Humber Estuary SAC are predicted due to chemical discharge in relation to the conservation objectives for grey seal.

b. Water quality effects – marine environment: The discharge of the chemical plume during operation is not expected to have any **significant** effect on foraging grey seals and this, alongside the very small percentage of the reference population that could be exposed to the area of predicted effect in marine water quality, indicates there is no potential for an effect on foraging grey seals to arise over the operational lifetime of the Sizewell C Project (see **section 9.4 a ii**) (Doc Ref 5.10).

The potential effect of the changes to water quality on prey species for foraging grey seal would not extend beyond the maximum predicted effect areas described for grey seals themselves. Consequently, the approach taken to assessing the effect on the foraging grey seals is worst case and there would be no additional impact as a result of the effects on prey species (see **section 9.4 a ii**) (Doc Ref 5.10).

Assessment of the discharge of the thermal plume on grey seals showed that the number of foraging grey seal that could be present in the maximum predicted surface area for a 2°C MAC rise in temperature (an area of 224.6 km^2) has been estimated as 8.5 individuals, which represents up to 0.1% of the reference population (or 0.13% of the Humber Estuary SAC site population). Therefore, no adverse effects on the integrity of the Humber Estuary SAC are predicted due to the Sizewell C thermal discharge in relation to the conservation objectives for grey seal (see **section 9.4 a ii**) (Doc Ref 5.10).

The number of foraging grey seal that could be present (as percentage of the reference population) in the area of the thermal plume from which prey species could be displaced has been estimated. As the maximum predicted impact area for any changes in water temperature would be the same for foraging grey seal and their prey, there would be no additional effects on grey seal as a result of the effects of any changes in water temperature on prey species (see **section 9.4 a ii**) (Doc Ref 5.10).

It is, therefore, concluded that the operation activities of the Sizewell C Project would not adversely affect the grey seal qualifying feature of the SAC from changes to marine water quality.

c. **Disturbance effects on species populations:** During construction and decommissioning, grey seals (and their prey) could be affected by noise generated during impact piling, drilling and dredging activities and UXO clearance.

   The assessment for impact piling and drilling and dredging activities has been concluded that there is no adverse effect on grey seal due to the temporary disturbance and intermittent duration of underwater noise, along with the relatively low and infrequent number of grey seal in and around the Sizewell C main development site (see **section 9.4 b i**) (Doc Ref 5.10).

   The assessment scenario of UXO clearance used a hypothetical explosive charge mass of 500 lb. Mitigation would be implemented for any UXO clearance following the latest guidance and requirements, and the Marine Mammal Management Plan (MMMP) for any UXO clearance would reduce the risk of permanent threshold shift (PTS) to grey seal. Therefore, under these circumstances, no adverse effects on the integrity of the Humber Estuary SAC are predicted from any permanent auditory injury from any UXO clearance associated with the Sizewell C Project in relation to the conservation objectives for grey seal (see **section 9.4 b i**) (Doc Ref 5.10).

   Any underwater noise effects on prey species are likely to be intermittent, temporary and highly localised, with potential for recovery following cessation of the disturbance activity. Any permanent loss or changes of prey habitat would typically represent a small percentage of the potential habitat in the surrounding area. Consequently, no indirect adverse effect on the integrity of the Humber Estuary SAC is predicted from disturbance effects on prey species during the construction or decommissioning of the Sizewell C main development site in relation to the conservation objectives for foraging grey seal (see **section 9.4 b i**) (Doc Ref 5.10).

   Therefore, no adverse effects on the integrity of the Humber Estuary SAC are predicted due to noise generated during the construction and decommissioning of the Sizewell C Project in relation to the conservation objectives for grey seal.

d. **Physical interaction between species and project infrastructure:** The construction and decommissioning activities of the Sizewell C Project identified a potential increase in collision risk between grey seals and vessels. The assessment identified that, on the assumption that grey seal would be disturbed from the area as a result of underwater noise from construction and decommissioning activities and vessels, there should be no potential for increased collision risk within the main development site (see **section 9.4 c i**) (Doc Ref 5.10). Therefore, no direct adverse effect on the integrity of the Humber Estuary SAC is predicted from any increased vessel collision risk during construction or decommissioning of the Sizewell C main development site in relation to the conservation objectives for foraging grey seal.

e. Physical interaction between species and project infrastructure: The operational activities of the Sizewell C Project identified a potential increase in collision risk between grey seals and vessels and impingement of prey species.

For the increase in collision risk, it has been assumed that the potential effects would be the same as for construction (outlined above) (see **section 9.4 c ii**) (Doc Ref 5.10).

An assessment has been made of the number of grey seal that could be displaced by the loss of prey availability through impingement. This assessment is based on the precautionary assumption that all grey seal prey species would be lost within close proximity of the intake tunnels. An area of effect has been defined as the study area for the Sizewell C Project, which is the Greater Sizewell Bay; a total area of 4,120 ha (or 41.2 km^2). This is considered to be precautionary, as not all prey species within that area would be lost and the effect would be temporary, as grey seal would be able to move to a nearby area where prey species are available. Hence, all grey seal prey species are expected to be at risk of a negligible effect only, with less than 1% of the available prey populations being affected (see **section 9.4 c ii**) (Doc Ref 5.10).

f. Physical interaction between species and project infrastructure: The SAC was assessed for impingement and entrainment effects from the Sizewell C Project on lamprey. The assessment showed that impingement of lamprey consisted of less than one fish for sea lamprey and 0.03% of the Humber run size for river lamprey. Lamprey is not predicted to be at risk from entrainment (see **section 10.3 b i**) (Doc Ref 5.10), updated by **section 10.2** of the **Shadow HRA Addendum** (Doc Ref. 5.10Ad).

In light of the above, adverse effect on the integrity of the Humber Estuary SAC can be excluded due to impingement and entrainment of river and sea lamprey during the operation of Sizewell C.

g. In-combination effects: A number of plans/projects have been identified for having a potential in-combination effect with the grey seals qualifying feature of the Humber Estuary (see **Table 9.23 and Table 9.24**) (Doc Ref 5.10). In relation to the conservation objective for grey seal, there is no potential for adverse effects on the integrity of the Humber Estuary SAC to arise due to the Sizewell C Project either alone or in-combination with other plans or projects (see **Table 9.26**) (Doc Ref 5.10).

HRA Integrity Matrix D1.5: Minsmere to Walberswick Heaths and Marshes SAC

Name of European site and designation: Minsmere to Walberswick Heaths and Marshes SAC															
EU Code: UK0012809															
Distance to NSIP: Adjacent															
European site features	**Adverse effect on integrity**														
Effect	Alteration of coastal processes/ sediment transport			Water quality effects – marine environment			Changes in air quality			Disturbance due to increase in recreational pressure			In-combination		
Stage of Development	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*
1210 Annual vegetation of drift lines	x **a**	x **a**	x **a**	x **b**	x **c**	x **b**	x **d**		x **d**	x **f**	x **g**	x **f**	x **h**	x **h**	x **h**
4030 European dry heaths							x **d**	x **e**	x **d**	x **f**	x **g**	x **f**	x **h**	x **h**	x **h**
1220 Perennial vegetation of stony banks	x **a**	x **a**	x **a**	x **b**	x **c**	x **b**	x **d**	x **e**	x **d**	x **f**	x **g**	x **f**	x **h**	x **h**	x **h**

a. Alteration of coastal processes/sediment transport: The changes in tidal currents, waves and sediment transport would be confined to the local area around the sources of disturbance and there would be no change to coastal processes and sediment transport of the 'annual vegetation of drift lines' and 'perennial vegetation of stony banks' qualifying features. Suspended sediment concentrations (SSCs) from dredging would reduce to background levels within four days after dredging ceases (see **section 7.3 and 7.7 c i**) (Doc Ref 5.10). It is, therefore, concluded that the construction, operation and decommissioning activities of the Sizewell C Project would not adversely affect the integrity of the Minsmere to Walberswick Heaths and Marshes SAC from changes to coastal processes and sediment transport.

b. **Water quality effects – marine environment:** During the construction and decommissioning phases, the installation/decommissioning of infrastructure in the marine environment and vessel traffic represent potential pathways for contamination. Contamination could result from resuspension of sediment-bound contaminants, accidental release of chemicals from vessels, and chemicals leaching from coatings on marine infrastructures. In addition, a number of discharges to the marine environment would occur during the construction phase via the combined discharge outfall, including site drainage, effluent from on-site treatment of sewage, dewatering activities, concrete-cleaning washes and wastewater from horizontal cooling water system tunnelling operations.

   The assessment of each potential pathway of contamination has identified that these discharges would not have an adverse effect on the qualifying features of the SAC (see **section 7.7 c ii**) (Doc Ref 5.10).

c. **Water quality effects – marine environment:** Marine and coastal habitats could be affected by changes in water quality during the operational phase due to discharge activities from the cooling water system, with respect to the thermal, chemical and moribund biota discharges. Hydrodynamic modelling has demonstrated that the extent of the Sizewell C thermal and chemical plumes do not intersect with the qualifying features of the SAC as they are located at, or above, mean high water springs (see **section 7.7 c ii**) (Doc Ref 5.10).

   The waters off Sizewell C are well mixed vertically, facilitating reaeration at the surface, background dissolved oxygen levels are high, and the water exchange rate of the Greater Sizewell Bay is enough to limit the extent and duration of any oxygen reduction from the input loading of BOD from biomass discharged from the fish return system (i.e. dead fish). This is predicted to have a negligible effect on water quality (see **section 7.7 c ii**) (Doc Ref 5.10).

   It is, therefore, concluded that the operation phase of the Sizewell C Project would not adversely affect the integrity of the Minsmere to Walberswick Heaths and Marshes SAC from changes to marine water quality.

d. **Changes in air quality:** The air quality assessment (**ES Volume 2, Chapter 12**: air quality) predicts that the extent of any dust-related effect is likely to occur over a relatively small area, with deposition likely to occur close (10s of metres) from the point of origin. Dust generation would likely continue for the duration of the construction phase, but the impacts of dust are likely to be reversible. The primary mitigation measure proposed is the development of a dust management plan outlining a range of measures that would ensure dust generation is kept to a minimum (and within the threshold limits of 0.5 $g/m^2/day$). It is concluded that there would not be an adverse effect on the integrity of the 'annual vegetation of drift lines' and 'perennial vegetation of stony banks' qualifying features of the Minsmere to Walberswick Heaths and Marshes SAC due to air quality effects during the construction and decommissioning phases (see **section 7.7 c iii**) (Doc Ref 5.10).

e. Changes in air quality: Air quality effects during the operational phase are assessed in **section 7.7 b i** (for European dry heaths) and **section 7.7 c iii** (for perennial vegetation of stony banks) (Doc Ref 5.10). The predicted PC and PEC during operation are assessed in the context of the critical levels for air emissions and critical loads for nutrient nitrogen and acid deposition, in the context of background conditions.

On the basis of these predictions, it is concluded that there would not be an adverse effect on the integrity of these qualifying features due to changes in air quality during the operational phase.

f. Disturbance due to increase in recreational pressure: There is the potential for an increase in visitor numbers or changes in patterns of use of recreational areas to occur due to the construction/ decommissioning workers and works associated with the Sizewell C Project. Mitigation measures have been established to minimise the requirement for both construction workers and existing recreational users from Sizewell to access the SAC for recreation. The Rights of Way and Access Strategy for the EDF Energy Estate would be developed to minimise the displacement of people away from the Sizewell C area and to nearby European sites to minimise trampling of vegetation. In addition, the strategy outlines a monitoring programme for recreational displacement to identify local mitigation measures, to be agreed with local land managers, which could be introduced to further reduce recreational disturbance (see **section 7.7 b ii**) (Doc Ref 5.10).

Therefore, it is concluded that an adverse effect would not arise from an increase in recreational pressure on the qualifying features of the Minsmere to Walberswick Heaths and Marshes SAC.

g. Disturbance due to increase in recreational pressure: The number of workers employed during normal operation is expected to be approximately 900, with an additional 1,000 during planned refuelling and maintenance shutdowns (every 18 months for each UK EPR™ unit) and would represent a substantial reduction in the number of workers which would be required at peak times during construction. Hence it can be concluded that the operation of Sizewell C would not have an adverse effect on European dry heaths due to recreational disturbance (see **section 7.7 b ii**) (Doc Ref 5.10).

h. In-combination effects: A number of plans/projects have been identified for having a potential in-combination effect with the grey seals qualifying feature of the Humber Estuary (see **Table 7.8**). In relation to the conservation objectives of the qualifying features of the SAC, there is no potential for adverse effects on the integrity of the SAC to arise due to the Sizewell C Project either alone or in-combination with other plans or projects (see **section 7.7 e**) (Doc Ref 5.10).

HRA Integrity Matrix D1.6: Orfordness-Shingle Street SAC

Name of European site and designation: Orfordness-Shingle Street SAC															
EU Code: UK0014780															
Distance to NSIP: 8.9 km															
European site features	**Adverse effect on integrity**														
Effect	Alteration of coastal processes / sediment transport			Water quality effects – marine environment			Changes in air quality			Disturbance due to increased recreational pressure			In-combination		
Stage of Development	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*
1150 Coastal lagoons **Priority feature*	x **a**	x **a**	x **a**	x **b**	x **c**	x **b**	x **e**	x **f**	x **e**				x **i**	x **i**	x **i**
1210 Annual vegetation of drift lines	x **a**	x **a**	x **a**	x **b**	x **d**	x **b**	x **e**		x **e**	x **h**	x **h**	x **h**	x **i**	x **i**	x **i**
1220 Perennial vegetation of stony banks	x **a**	x **a**	x **a**	x **b**	x **d**	x **b**	x **e**	x **g**	x **e**	x **h**	x **h**	x **h**	x **i**	x **i**	x **i**

a. Alteration of coastal processes/sediment transport: The changes in tidal currents, waves and sediment transport would be confined to the local area around the sources of disturbance and there would be no change to coastal processes and sediment transport of the qualifying features of the SAC. Suspended sediment concentrations (SSCs) from dredging would reduce to background levels within four days after dredging ceases (see **section 7.3 and 7.9 b i**) (Doc Ref 5.10). It is, therefore, concluded that the construction, operation and decommissioning activities of the Sizewell C Project would not adversely affect the integrity of the SAC from changes to coastal processes and sediment transport.

b. **Water quality effects – marine environment:** During the construction and decommissioning phases, the installation/decommissioning of infrastructure in the marine environment and vessel traffic represent potential pathways for contamination. In addition, a number of discharges to the marine environment would occur during the construction phase via the combined discharge outfall. The assessment has identified that these discharges would not have an adverse effect on the qualifying features of the SAC (see **section 7.9 b ii**) (Doc Ref 5.10).

c. **Water quality effects – marine environment:** Marine and coastal habitats could be affected by changes in water quality during the operational phase due to discharge activities from the cooling water system, with respect to the thermal, chemical and moribund biota discharges.

   Hydrodynamic modelling has demonstrated that there is the potential for the thermal plume to interact with the coastal lagoons feature of the SAC. Whilst there is a predicted overlap in the 2°C (98th percentile) EQS thermal contour line and the SAC, the extent of this is limited to within the tidal range, i.e. up to mean high water springs. As the lagoons sit behind the shingle bank, the seawater would percolate slowly through the shingle before reaching the lagoons themselves. The slow percolation of water through the lagoon would result in dissipation of any retained heat by the time it reaches the lagoons, thus reducing the percolating seawater temperature to below the EQS. Overtopping of the shingle bank with seawater during high tide would introduce elevated seawater temperatures for a short duration of time only, with seawater temperature well below the short-term 5°C benchmark. Consequently, an adverse effect on the water quality of the coastal lagoons of the SAC is not predicted (see **section 7.9 b ii**) (Doc Ref 5.10).

   The hydrodynamic modelling shows that the chemical plumes do not interact with the coastal lagoons qualifying feature of the SAC.

   The waters off Sizewell C are well mixed vertically, facilitating reaeration at the surface, background dissolved oxygen levels are high, and the water exchange rate of the Greater Sizewell Bay is enough to limit the extent and duration of any oxygen reduction from the input loading of BOD from biomass discharged from the fish return system (i.e. dead fish). This is predicted to have a negligible effect on water quality (see **section 7.9 b ii**) (Doc Ref 5.10).

d. **Water quality effects – marine environment:** Hydrodynamic modelling has demonstrated that the extent of the Sizewell C thermal and chemical plumes do not intersect with the SAC (see **section 7.9 c ii**) (Doc Ref 5.10). It is, therefore, concluded that the operational activities of the Sizewell C Project would not adversely affect the integrity of the SAC from changes to marine water quality.

e. **Changes in air quality:** The Orfordness to Shingle Street SAC falls beyond the study area for the assessment of dust emissions based on the IAQM guidance and no further consideration of construction dust in the context of this SAC is necessary (see **section 7.9 b iii and 7.9 c iii**) (Doc Ref 5.10).

f. **Changes in air quality:** The coastal lagoon qualifying feature is located more than 10 km from the source of the operational combustion activity and modelling of the combustion scenarios predicts that the Critical Levels for NOx (long-term), NOx (short-term) and SO_2 (long-term) would not be exceeded. In addition, the Critical Load for nutrient nitrogen deposition would not be exceeded. On the basis of these predictions, it is concluded that there would not be an adverse effect on the integrity of the coastal lagoons of the Orfordness to Shingle Street SAC due to changes in air quality during the operational phase (see **section 7.9 b iii**) (Doc Ref 5.10).

g. **Changes in air quality:** Air quality effects during the operational phase are assessed in **section 7.9 c iii** (for perennial vegetation of stony banks) (Doc Ref 5.10). The predicted PC and PEC during operation are assessed in the context of the critical levels for air emissions and critical loads for nutrient nitrogen and acid deposition.

   On the basis of these predictions, it is concluded that there would not be an adverse effect on the integrity of these qualifying features due to changes in air quality during the operational phase.

h. **Disturbance due to increase in recreational pressure:** During construction, operation and decommissioning, the key potential effect pathways experienced by the plant and habitats of the Orfordness to Shingle Street SAC would be associated with disturbance effects on habitats (comprising trampling and other effects due to displacement of recreational users). The main area where sensitive shingle vegetation is present is along Orfordness to Shingle Street spit. The main access point to the shingle spit is by boat from Orford, although it is possible to access the spit by walking from Aldeburgh, but it is envisaged that most people would access the town beach rather than undertake a longer return walk to access the shingle spit.

   For these reasons, assessment concluded that there would not be an adverse effect on the integrity of the 'annual vegetation of drift lines' and 'perennial vegetation of stony banks' of the Orfordness to Shingle Street SAC due to recreational disturbance effects during the construction, decommissioning and operational phases see **section 7.9 c iv**) (Doc Ref 5.10).

i. **In-combination effects:** The screening process identified two plans/projects that could have an in-combination effect with the qualifying features of the SAC: Suffolk Shoreline Management Plan (SMP7) and shingle recycling from Sudbourne Beach to Slaughden Sea Defences.

   The in-combination assessment of SMP7 with the Sizewell C Project identified that the proposed management approaches outlined within the preliminary assessment of the SMP do not have the potential to cause an in-combination effect with the construction, commissioning, operational and decommissioning activities of the Sizewell C Project (see **section 7.9 e**) (Doc Ref 5.10). Therefore, it is predicted that an in-combination effect on coastal processes and water quality would not arise due to the Sizewell C Project and the outcomes of the Suffolk Shoreline Management Plan.

With regard to proposed shingle recycling from Sudbourne Beach to Slaughden sea defences, the Environment Agency state in its 'Summary Document to inform Appropriate Assessment of shingle recycling' that the only potential for an impact is on the feature 'annual vegetation of drift lines' for the Orfordness to Shingle Street SAC. However, any decrease in vegetation cover via this operation is deemed **not significant** in comparison to changes to the drift line vegetation caused by storms and storm surges. There are, therefore, no predicted in-combination effects due to the proposed Sizewell C Project and shingle recycling operations at Sudbourne beach on the Orfordness to Shingle Street SAC (see **section 7.9 e**) (Doc Ref 5.10).

HRA Integrity Matrix D1.7: Southern North Sea SAC

Name of European site and designation: Southern North Sea SAC															
EU Code: UK0030395															
Distance to NSIP: Main Development Site – within and adjacent															
European site features	**Adverse effect on integrity**														
Effect	Water quality effects – marine environment			Direct habitat loss and direct / indirect habitat fragmentation			Disturbance effects on species populations			Physical interaction between species and project infrastructure			In-combination		
Stage of Development	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*
1351 Harbour porpoise *Phocoena*	x **a**	x **b**	x **a**	x **c**	x **d**	x **c**	x **e**		x **e**	x **f**	x **g**	x f	x **h**	x **h**	x **h**

a. Water quality effects – marine environment: With respect to marine water quality, the largest area of effect on foraging harbour porpoise is predicted to occur during operation (from the total residual oxidants (TRO) plume for both Sizewell B and C in-combination, affecting an area of 7.26 km^2). For assessing the potential effect of construction and decommissioning on marine water quality, as a precautionary approach, the number of harbour porpoise that potentially could be present (and percentage of the reference population) within this area of effect has been estimated. This is 4.4 individuals (or 0.001% of the North Sea management unit reference population). The assessment calculated that displacement of harbour porpoise, therefore, would not exceed either the 20% threshold of effect at any one time or exceed the 10% seasonal component of the SAC on average over the season (see **section 9.5 a i**) (Doc Ref 5.10).

The number of foraging harbour porpoise that could be present (and percentage of the reference population) in the area from which prey species could be impacted, as a result of any changes to water quality, has been estimated based on the maximum area of effect of 7.26 km^2. As the maximum predicted impact area for any increased suspended sediments and contaminant re-mobilisation is the same for foraging harbour porpoise as it is for their prey, there would be no additional impacts on foraging harbour porpoise as a result of the effects of any changes to water quality on prey species within the construction or decommissioning phases (see **section 9.5 a i**) (Doc Ref 5.10).

Therefore, no adverse effects on the integrity of the Southern North Sea SAC are predicted due to the Sizewell C chemical discharge in relation to the conservation objectives for harbour porpoise.

b. Water quality effects – marine environment: The discharge of the chemical plume during operation is not expected to have any **significant** effect on foraging harbour porpoise. On a precautionary basis, the number of harbour porpoise that could be present within the maximum area of effect (of 7.26 km^2 for TRO effect area) has been estimated to be 4.4 individuals, or 0.001% of the North Sea MU reference population. The maximum area of effect equates to 0.06% of the Southern North Sea SAC winter area and, as a worst-case, the maximum seasonal average would be 0.06%. As above, displacement of harbour porpoise, therefore, would not exceed either the 20% threshold of effect at any one time or the 10% seasonal component of the SAC on average over the season (see **section 9.5 a ii**) (Doc Ref 5.10).

The potential effect of the changes to water quality on prey species for foraging harbour porpoise would not extend beyond the maximum predicted effect areas described for harbour porpoise themselves. Consequently, the approach taken to assessing the effect on the foraging harbour porpoise is worst case and there would be no additional impact as a result of the effects on prey species (see **section 9.5 a ii**) (Doc Ref 5.10).

Assessment of the discharge of the thermal plume on harbour porpoise is based on the number of harbour porpoise that could be present within the maximum area of effect (an area of 224.6 km^2 for the 2°C MAC area at the sea surface). This has been estimated to be 136.3 individuals, or 0.04% of the North Sea MU reference population. The maximum area of effect equates to 1.8% of the Southern North Sea SAC winter area. Similarly, as a worst case, it is assumed that changes to water quality could occur throughout the duration of the winter season, which would result in a seasonal average of 1.8% of the Southern North Sea SAC winter area. Displacement of harbour porpoise, therefore, would not exceed either the 20% threshold of effect at any one time nor the 10% seasonal component of the SAC on average over the season.

The thermal tolerance of the key prey species for harbour porpoise has been reviewed, including sprat, herring, whiting, and dover sole. As a worst-case approach, it can be assumed that all harbour porpoise prey species would be displaced from the area within the 2°C contour; but no fatalities of prey species are expected and prey would be available to marine mammals outside of the 2°C contour. On a precautionary basis, the number of harbour porpoise that could be present in the area of the thermal plume from which prey species could be displaced has been estimated. However, as the maximum predicted impact area for any changes in water temperature would be the same for marine mammal and their prey, there would be no additional effects on harbour porpoise as a result of the effects of any changes in water temperature on prey species (see **section 9.5 a ii**) (Doc Ref 5.10).

It is, therefore, concluded that the operation activities of the Sizewell C Project would not adversely affect the harbour porpoise qualifying feature of the SAC from changes to marine water quality.

c. **Direct habitat loss and direct / indirect habitat fragmentation**: The number of harbour porpoise that could be at risk of displacement as a result of a habitat change due to the dredging for the beach landing facility, is up to 0.006 individuals (or 0.000002% of the North Sea Management Unit reference population). The maximum area of the displacement effect for harbour porpoise as a result of temporary changes to habitat equates to 0.00007% of the winter area of the Southern North Sea SAC (12,697 km^2) and, therefore, would be below the spatial disturbance threshold of 20% and temporal displacement threshold of 10% of the seasonal component. Under these circumstances, no direct adverse effect on the integrity of the Southern North Sea SAC is predicted due to habitat loss associated with the Sizewell C main development site in relation to the conservation objectives for harbour porpoise (see **section 9.5 b i**) (Doc Ref 5.10).

d. **Direct habitat loss and direct / indirect habitat fragmentation**: During the operational period of the Sizewell C Project, the presence of the offshore infrastructure has the potential to cause the long-term displacement of harbour porpoise, through the long-term loss of habitat. This would affect a total area of 0.02 km^2. The number of harbour porpoise that could be at risk of displacement as a result of long-term habitat change due to the introduction of hard structures is up to 0.01 individuals (or 0.000004% of the North Sea Management Unit reference population). The maximum area of the displacement effect for harbour porpoise as a result of the introduction of hard substrate through the operational period equates to 0.0002% of the winter area of the Southern North Sea SAC and, therefore, is below the spatial disturbance threshold of 20% and the temporal displacement threshold of 10% of the seasonal component. Consequently, no direct adverse effect on the integrity of the Southern North Sea SAC is predicted due to habitat loss associated with the Sizewell C main development site in relation to the conservation objectives for harbour porpoise (see **section 9.5 b ii**) (Doc Ref 5.10).

e. **Disturbance effects on species populations:** During construction and decommissioning, harbour porpoise (and their prey) could be affected by noise generated during impact piling, drilling and dredging activities and UXO clearance.

   The assessment for impact piling and drilling and dredging activities has concluded that there is no adverse effect on harbour porpoise due to the temporary disturbance and intermittent duration of underwater noise (see section **9.5 c i**) (Doc Ref 5.10).

   The assessment scenario of UXO clearance used a hypothetical explosive charge mass of 500 lb. Mitigation would be implemented for any UXO clearance following the latest guidance and requirements, and the Marine Mammal Management Plan (MMMP) for any UXO clearance would reduce the risk of Permanent Threshold Shift (PTS) to harbour porpoise. Therefore, under these circumstances, no direct adverse effects on the integrity of the SAC are predicted from

any permanent auditory injury from any UXO clearance associated with the Sizewell C Project in relation to the conservation objectives for harbour porpoise (see **section 9.5 c i**) (Doc Ref 5.10).

Any underwater noise effects on prey species are likely to be intermittent, temporary and highly localised, with potential for recovery following cessation of the disturbance activity. Any permanent loss or changes of prey habitat would typically represent a small percentage of the potential habitat in the surrounding area. Consequently, no indirect adverse effect on the integrity of the Southern North Sea SAC is predicted from disturbance effects on prey species during the construction or decommissioning of the Sizewell C main development site in relation to the conservation objectives for foraging harbour porpoise (see **section 9.5 c i**) (Doc Ref 5.10).

Therefore, no adverse effects on the integrity of the SAC are predicted due to noise generated during the construction and decommissioning of the Sizewell C Project in relation to the conservation objectives for harbour porpoise.

f. Physical interaction between species and project infrastructure: The construction and decommissioning activities of the Sizewell C Project identified a potential increase in collision risk between harbour porpoise and vessels. The assessment identified that, on the assumption that harbour porpoise would be disturbed from the area as a result of underwater noise from construction and decommissioning activities and vessels, there should be no potential for increased collision risk within the main development site (see **section 9.5 d i**) (Doc Ref 5.10). Therefore, no direct adverse effect on the integrity of the SAC is predicted from any increased vessel collision risk during construction or decommissioning of the Sizewell C main development site in relation to the conservation objectives for foraging harbour porpoise.

g. Physical interaction between species and project infrastructure: The operational activities of the Sizewell C Project identified a potential increase in collision risk between harbour porpoise and vessels and impingement of prey species.

For the increase in collision risk, it has been assumed that the potential effects would be the same as for construction (outlined above) (see **section 9.5 d ii**) (Doc Ref 5.10).

An assessment has been made of the number of harbour porpoise that could be displaced by the loss of prey availability through impingement. This assessment is based on the precautionary assumption that all harbour porpoise prey species would be lost within close proximity of the intake tunnels. An area of effect has been defined as the study area for the Sizewell C Project, which is the Greater Sizewell Bay; a total area of 4,120 ha (or 41.2 km^2). This is considered to be precautionary, as not all prey species within that area would be lost and the effect would be temporary, as harbour porpoise would be able to move to a nearby area where prey species are available. Hence, all harbour porpoise prey

species are expected to be at risk of a negligible effect only, with less than 1% of the available prey populations being affected (see **section 9.5 d ii**) (Doc Ref 5.10).

h. In-combination effects: A number of plans/projects have been identified for having a potential in-combination effect with the harbour porpoise qualifying feature of the Southern North Sea SAC (see **Table 9.34** to **Table 9.37**) (Doc Ref 5.10). In relation to the conservation objective for harbour porpoise, there is no potential for adverse effects on the integrity of the SAC to arise due to the Sizewell C Project either alone or in-combination with other plans or projects (see **Table 9.38**) (Doc Ref 5.10).

HRA Integrity Matrix D1.8: The Wash and North Norfolk Coast SAC

Name of European site and designation: The Wash and North Norfolk Coast SAC												
EU Code: UK0017075												
Distance to NSIP: 88.2 km												
European site features	**Adverse effect on integrity**											
Effect	Water quality effects – marine environment			Disturbance effects on species populations			Physical interaction between species and project infrastructure			In-combination		
Stage of Development	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*
1365 Harbour seal *Phoca vitulina*	x **a**	x **b**	x **a**	x **c**	x **c**	x **c**	x **d**	x **e**	x **d**	x **f**	x **f**	x **f**

a. Water quality effects – marine environment: With respect to marine water quality, the largest area of effect on foraging harbour seal is predicted to occur during operation (from the total residual oxidants (TRO) plume for both Sizewell B and C in-combination, affecting an area of 7.26 km^2). For assessing the potential effect of construction and decommissioning on marine water quality, as a precautionary approach, the number of harbour seal that potentially could be present (and percentage of the reference population) within this area of effect has been estimated. This is 0.3 individuals; up to 0.006% of the reference population (or up to 0.008% of the estimated Wash and North Norfolk Coast SAC population) (see **section 9.6 a i**) (Doc Ref 5.10).

The number of foraging harbour seals that could be present (and percentage of the reference population) in the area from which prey species could be impacted, as a result of any changes to water quality, has been estimated based on the maximum area of effect of 7.26 km^2. As the maximum predicted impact area for any increased suspended sediments and contaminant re-mobilisation is the same for foraging harbour seal as it is for their prey, there would be no additional impacts on foraging harbour seal as a result of the effects of any changes to water quality on prey species within the construction or decommissioning phases (see **section 9.6 a i**) (Doc Ref 5.10).

Therefore, no adverse effects on the integrity of the SAC are predicted due to the Sizewell C chemical discharge in relation to the conservation objectives for harbour seal.

b. **Water quality effects – marine environment:** The discharge of the chemical plume during operation is not expected to have any **significant** effect on foraging harbour seals and this, alongside the very small percentage of the reference population that could be exposed to the area of predicted effect in marine water quality, indicates there is no potential for an effect on foraging harbour seals to arise over the operational lifetime of the Sizewell C Project (see **section 9.6 a ii**) (Doc Ref 5.10).

   The potential effect of the changes to water quality on prey species for foraging harbour seals would not extend beyond the maximum predicted effect areas described for the harbour seals themselves. Consequently, the approach taken to assessing the effect on the foraging harbour seals is worst case and there would be no additional impact as a result of the effects on prey species (see **section 9.6 a ii**) (Doc Ref 5.10).

   Assessment of the discharge of the thermal plume on harbour seals showed that the number of foraging harbour seals that could be present in the maximum predicted surface area for a 2°C MAC rise in temperature (an area of 224.6 km^2) has been estimated as 8.8 individuals, which represents up to 0.18% of the reference population (or 0.24% of the Wash and North Norfolk Coast SAC population). Therefore, no direct adverse effects on the integrity of the SAC are predicted due to the Sizewell C thermal discharge in relation to the conservation objectives for harbour seal (see **section 9.6 a ii**) (Doc Ref 5.10).

   The number of foraging harbour seals that could be present (as percentage of the reference population) in the area of the thermal plume from which prey species could be displaced has been estimated. As the maximum predicted impact area for any changes in water temperature would be the same for foraging harbour seal and their prey, there would be no additional effects on harbour seal as a result of the effects of any changes in water temperature on prey species (see **section 9.6 a ii**) (Doc Ref 5.10).

   It is, therefore, concluded that the operation activities of the Sizewell C Project would not adversely affect the harbour seal qualifying feature of the SAC from changes to marine water quality.

c. **Disturbance effects on species populations:** During construction and decommissioning, harbour seals (and their prey) could be affected by noise generated during impact piling, drilling and dredging activities, and UXO clearance.

   The assessment for impact piling and drilling and dredging activities, it has been concluded that there is no adverse effect on harbour seal due to the temporary disturbance and intermittent duration of underwater noise, along with the relatively low and infrequent number of grey seal in and around the Sizewell C main development site (see section **9.6 b i**) (Doc Ref 5.10).

The assessment scenario of UXO clearance used a hypothetical explosive charge mass of 500 lb. Mitigation would be implemented for any UXO clearance following the latest guidance and requirements, and the Marine Mammal Management Plan (MMMP) for any UXO clearance would reduce the risk of permanent threshold shift (PTS) to harbour seal. Therefore, under these circumstances, no direct adverse effects on the integrity of the SAC are predicted from any permanent auditory injury from any UXO clearance associated with the Sizewell C Project in relation to the conservation objectives for harbour seal (see **section 9.6 b i**) (Doc Ref 5.10).

Any underwater noise effects on prey species are likely to be intermittent, temporary and highly localised, with potential for recovery following cessation of the disturbance activity. Any permanent loss or changes of prey habitat would typically represent a small percentage of the potential habitat in the surrounding area. Consequently, no indirect adverse effect on the integrity of the SAC is predicted from disturbance effects on prey species during the construction or decommissioning of the Sizewell C main development site in relation to the conservation objectives for foraging harbour seal (see **section 9.6 b i**) (Doc Ref 5.10).

Therefore, no adverse effects on the integrity of The Wash and North Norfolk Coast SAC are predicted due to noise generated during the construction and decommissioning of the Sizewell C Project in relation to the conservation objectives for harbour seal.

d. Physical interaction between species and project infrastructure: The construction and decommissioning activities of the Sizewell C Project identified a potential increase in collision risk between harbour seals and vessels. The assessment identified that, on the assumption that harbour seals would be disturbed from the area as a result of underwater noise from construction and decommissioning activities and vessels, there should be no potential for increased collision risk (see **section 9.6 c i**) (Doc Ref 5.10). Therefore, no direct adverse effect on the integrity of the SAC is predicted from any increased vessel collision risk during construction or decommissioning of the Sizewell C main development site in relation to the conservation objectives for foraging harbour seal.

e. Physical interaction between species and project infrastructure: The operational activities of the Sizewell C Project identified a potential increase in collision risk between harbour seals and vessels and impingement of prey species.

For the increase in collision risk, it has been assumed that the potential effects would be the same as for construction (outlined above) (see **section 9.6 c ii**) (Doc Ref 5.10).

An assessment has been made of the number of harbour seals that could be displaced by the loss of prey availability through impingement. This assessment is based on the precautionary assumption that all harbour seal prey species would be lost within close proximity of the intake tunnels. An area of effect has been defined as the study area for the

Sizewell C Project, which is the Greater Sizewell Bay; a total area of 4,120 ha (or 41.2 km^2). This is considered to be precautionary, as not all prey species within that area would be lost and the effect would be temporary, as harbour seals would be able to move to a nearby area where prey species are available. Hence, all harbour seal prey species are expected to be at risk of a negligible effect only, with less than 1% of the available prey populations being affected (see **section 9.6 c ii**) (Doc Ref 5.10).

f. In-combination effects: A number of plans/projects have been identified for having a potential in-combination effect with the harbour seal qualifying feature of the Humber Estuary (see **Table 9.46** to **Table 9.48**) (Doc Ref 5.10). In relation to the conservation objective for harbour seal, there is no potential for adverse effects on the integrity of The Wash and North Norfolk Coast SAC to arise due to the Sizewell C Project either alone or in-combination with other plans or projects (see **Table 9.49**) (Doc Ref 5.10).

HRA Integrity Matrix D1.9: Schelde- en Durmeëstuarium van de Nederlandse grens tot Gent SCI

Name of European site and designation: Schelde- en Durmeëstuarium van de Nederlandse grens tot Gent SCI						
EU Code: BE2300006						
Distance to NSIP: 197 km						
European site features	**Adverse effect on integrity**					
Effect	Physical interaction between species and project infrastructure			In combination effects		
Stage of Development	*C*	*O*	*D*	*C*	*O*	*D*
1103 Twaite shad *Alosa fallax*		x **a**				
1099 River lamprey *Lampetra fluviatilis*		x **b**				

a. **Physical interaction between species and project infrastructure:** The SAC was assessed for impingement and entrainment effects from the Sizewell C Project on twaite shad. The assessment showed that impingement of twaite shad consisted of 1,067 individuals (0.02% of the population). At 0.02% impingement of the SSB, it can be concluded that there would be no adverse effect on twaite shad and, therefore, no adverse effect on the integrity of the site. Twaite shad was not predicted to be at risk from entrainment (see **section 10.5 b i**) (Doc Ref 5.10), updated by **section 10.4** of the **Shadow HRA Addendum** (Doc Ref. 5.10Ad).
b. **Physical interaction between species and project infrastructure:** The impingement assessment predicts that 0.03% of the Humber run size for river lamprey would be impinged. For all other European sites, there is a weaker pathway for effect compared with the Humber Estuary SAC. It can be concluded there would not be an adverse effect on the integrity of the European site (**section 10.3, Shadow HRA Addendum,** Doc Ref. 5.10Ad).

HRA Integrity Matrix D1.10: Unterweser SCI

Name of European site and designation: Unterweser SCI						
EU Code: DE2316331						
Distance to NSIP: 479 km						
European site features	**Adverse effect on integrity**					
Effect	Physical interaction between species and project infrastructure			In combination effects		
Stage of Development	*C*	*O*	*D*	*C*	*O*	*D*
1103 Twaite shad *Alosa fallax*		x **a**				
1099 River lamprey *Lampetra fluviatilis*		x **b**				

a. **Physical interaction between species and project infrastructure:** The SAC was assessed for impingement and entrainment effects from the Sizewell C Project on twaite shad. The assessment showed that impingement of twaite shad consisted of 1,067 individuals (0.02% of the population). At 0.02% impingement of the SSB, it can be concluded that there would be no adverse effect on twaite shad and, therefore, no adverse effect on the integrity of the site. Twaite shad was not predicted to be at risk from entrainment (see **section 10.5 b i**) (Doc Ref 5.10), updated by **section 10.4** of the **Shadow HRA Addendum** (Doc Ref. 5.10Ad).
b. **Physical interaction between species and project infrastructure:** The impingement assessment predicts that 0.03% of the Humber run size for river lamprey would be impinged. For all other European sites, there is a weaker pathway for effect compared with the Humber Estuary SAC. It can be concluded there would not be an adverse effect on the integrity of the European site (**section 10.3, Shadow HRA Addendum,** Doc Ref. 5.10Ad).

HRA Integrity Matrix D1.11: Weser bei Bremerhaven SCI

Name of European site and designation: Weser bei Bremerhaven SCI						
EU Code: DE2417370						
Distance to NSIP: 483 km						
European site features	**Adverse effect on integrity**					
Effect	Physical interaction between species and project infrastructure			In combination effects		
Stage of Development	*C*	*O*	*D*	*C*	*O*	*D*
1103 Twaite shad *Alosa fallax*		x **a**				
1099 River lamprey *Lampetra fluviatilis*		x **b**				

a. **Physical interaction between species and project infrastructure:** The SAC was assessed for impingement and entrainment effects from the Sizewell C Project on twaite shad. The assessment showed that impingement of twaite shad consisted of 1,067 individuals (0.02% of the population). At 0.02% impingement of the SSB, it can be concluded that there would be no adverse effect on twaite shad and, therefore, no adverse effect on the integrity of the site. Twaite shad was not predicted to be at risk from entrainment (see **section 10.5 b i**) (Doc Ref 5.10), updated by **section 10.4** of the **Shadow HRA Addendum** (Doc Ref. 5.10Ad).
b. **Physical interaction between species and project infrastructure:** The impingement assessment predicts that 0.03% of the Humber run size for river lamprey would be impinged. For all other European sites, there is a weaker pathway for effect compared with the Humber Estuary SAC. It can be concluded there would not be an adverse effect on the integrity of the European site (**section 10.3, Shadow HRA Addendum,** Doc Ref. 5.10Ad).

HRA Integrity Matrix D1.12: Nebenarme der Weser mit Strohauser Plate und Juliusplate SCI

Name of European site and designation: Nebenarme der Weser mit Strohauser Plate und Juliusplate SCI						
EU Code: DE2516331						
Distance to NSIP: 475 km						
European site features	**Adverse effect on integrity**					
Effect	Physical interaction between species and project infrastructure			In combination effects		
Stage of Development	*C*	*O*	*D*	*C*	*O*	*D*
1103 Twaite shad *Alosa fallax*		x **a**				
1099 River lamprey *Lampetra fluviatilis*		x **b**				

a. **Physical interaction between species and project infrastructure:** The SAC was assessed for impingement and entrainment effects from the Sizewell C Project on twaite shad. The assessment showed that impingement of twaite shad consisted of 1,067 individuals (0.02% of the population). At 0.02% impingement of the SSB, it can be concluded that there would be no adverse effect on twaite shad and, therefore, no adverse effect on the integrity of the site. Twaite shad was not predicted to be at risk from entrainment (see **section 10.5 b i**) (Doc Ref 5.10), updated by **section 10.4** of the **Shadow HRA Addendum** (Doc Ref. 5.10Ad).
b. **Physical interaction between species and project infrastructure:** The impingement assessment predicts that 0.03% of the Humber run size for river lamprey would be impinged. For all other European sites, there is a weaker pathway for effect compared with the Humber Estuary SAC. It can be concluded there would not be an adverse effect on the integrity of the European site (**section 10.3, Shadow HRA Addendum,** Doc Ref. 5.10Ad).

HRA Integrity Matrix D1.13: Schleswig-Holsteinisches Elbästuar und angrenzende Flächen SCI

Name of European site and designation: Schleswig-Holsteinisches Elbästuar und angrenzende Flächen SCI						
EU Code: DE2323392						
Distance to NSIP: 509 km						
European site features	**Adverse effect on integrity**					
Effect	Physical interaction between species and project infrastructure			In combination effects		
Stage of Development	*C*	*O*	*D*	*C*	*O*	*D*
1103 Twaite shad *Alosa fallax*		x **a**				
1099 River lamprey *Lampetra fluviatilis*		x **b**				

a. **Physical interaction between species and project infrastructure:** The SAC was assessed for impingement and entrainment effects from the Sizewell C Project on twaite shad. The assessment showed that impingement of twaite shad consisted of 1,067 individuals (0.02% of the population). At 0.02% impingement of the SSB, it can be concluded that there would be no adverse effect on twaite shad and, therefore, no adverse effect on the integrity of the site. Twaite shad was not predicted to be at risk from entrainment (see **section 10.5 b i**) (Doc Ref 5.10), updated by **section 10.4** of the **Shadow HRA Addendum** (Doc Ref. 5.10Ad).
b. **Physical interaction between species and project infrastructure:** The impingement assessment predicts that 0.03% of the Humber run size for river lamprey would be impinged. For all other European sites, there is a weaker pathway for effect compared with the Humber Estuary SAC. It can be concluded there would not be an adverse effect on the integrity of the European site (**section 10.3, Shadow HRA Addendum,** Doc Ref. 5.10Ad).

HRA Integrity Matrix D1.14: Unterelbe SCI

Name of European site and designation: Unterelbe SCI						
EU Code: DE2018331						
Distance to NSIP: 508 km						
European site features	**Adverse effect on integrity**					
Effect	Physical interaction between species and project infrastructure			In combination effects		
Stage of Development	*C*	*O*	*D*	*C*	*O*	*D*
1103 Twaite shad *Alosa fallax*		x **a**				
1099 River lamprey *Lampetra fluviatilis*		x **b**				

a. **Physical interaction between species and project infrastructure:** The SAC was assessed for impingement and entrainment effects from the Sizewell C Project on twaite shad. The assessment showed that impingement of twaite shad consisted of 1,067 individuals (0.02% of the population). At 0.02% impingement of the SSB, it can be concluded that there would be no adverse effect on twaite shad and, therefore, no adverse effect on the integrity of the site. Twaite shad was not predicted to be at risk from entrainment (see **section 10.5 b i**) (Doc Ref 5.10), updated by **section 10.4** of the **Shadow HRA Addendum** (Doc Ref. 5.10Ad).
b. **Physical interaction between species and project infrastructure:** The impingement assessment predicts that 0.03% of the Humber run size for river lamprey would be impinged. For all other European sites, there is a weaker pathway for effect compared with the Humber Estuary SAC. It can be concluded there would not be an adverse effect on the integrity of the European site (**section 10.3, Shadow HRA Addendum,** Doc Ref. 5.10Ad).

HRA Integrity Matrix D1.15: Mühlenberger Loch/Neßsand SCI

Name of European site and designation: Mühlenberger Loch/Neßsand SCI						
EU Code: DE2424302						
Distance to NSIP: 563 km						
European site features	**Adverse effect on integrity**					
Effect	Physical interaction between species and project infrastructure			In combination effects		
Stage of Development	*C*	*O*	*D*	*C*	*O*	*D*
1103 Twaite shad *Alosa fallax*		x **a**				
1099 River lamprey *Lampetra fluviatilis*		x **b**				

a. **Physical interaction between species and project infrastructure:** The SAC was assessed for impingement and entrainment effects from the Sizewell C Project on twaite shad. The assessment showed that impingement of twaite shad consisted of 1,067 individuals (0.02% of the population). At 0.02% impingement of the SSB, it can be concluded that there would be no adverse effect on twaite shad and, therefore, no adverse effect on the integrity of the site. Twaite shad was not predicted to be at risk from entrainment (see **section 10.5 b i**) (Doc Ref 5.10), updated by **section 10.4** of the **Shadow HRA Addendum** (Doc Ref. 5.10Ad).
b. **Physical interaction between species and project infrastructure:** The impingement assessment predicts that 0.03% of the Humber run size for river lamprey would be impinged. For all other European sites, there is a weaker pathway for effect compared with the Humber Estuary SAC. It can be concluded there would not be an adverse effect on the integrity of the European site (**section 10.3, Shadow HRA Addendum,** Doc Ref. 5.10Ad).

HRA Integrity Matrix D1.16: Rapfenschutzgebiet Hamburger Stromelbe SCI

Name of European site and designation: Rapfenschutzgebiet Hamburger Stromelbe SCI						
EU Code: DE2424303						
Distance to NSIP: 565 km						
European site features	**Adverse effect on integrity**					
Effect	Physical interaction between species and project infrastructure			In combination effects		
Stage of Development	*C*	*O*	*D*	*C*	*O*	*D*
1103 Twaite shad *Alosa fallax*		x **a**				
1099 River lamprey *Lampetra fluviatilis*		x **b**				

a. **Physical interaction between species and project infrastructure:** The SAC was assessed for impingement and entrainment effects from the Sizewell C Project on twaite shad. The assessment showed that impingement of twaite shad consisted of 1,067 individuals (0.02% of the population). At 0.02% impingement of the SSB, it can be concluded that there would be no adverse effect on twaite shad and, therefore, no adverse effect on the integrity of the site. Twaite shad was not predicted to be at risk from entrainment (see **section 10.5 b i**) (Doc Ref 5.10), updated by **section 10.4** of the **Shadow HRA Addendum** (Doc Ref. 5.10Ad).
b. **Physical interaction between species and project infrastructure:** The impingement assessment predicts that 0.03% of the Humber run size for river lamprey would be impinged. For all other European sites, there is a weaker pathway for effect compared with the Humber Estuary SAC. It can be concluded there would not be an adverse effect on the integrity of the European site (**section 10.3, Shadow HRA Addendum,** Doc Ref. 5.10Ad).

HRA Integrity Matrix D1.17: Hamburger Unterelbe SCI

Name of European site and designation: Hamburger Unterelbe SCI						
EU Code: DE2526305						
Distance to NSIP: 582 km						
European site features	**Adverse effect on integrity**					
Effect	Physical interaction between species and project infrastructure			In combination effects		
Stage of Development	*C*	*O*	*D*	*C*	*O*	*D*
1103 Twaite shad *Alosa fallax*		x **a**				

a. Physical interaction between species and project infrastructure: The SAC was assessed for impingement and entrainment effects from the Sizewell C Project on twaite shad. The assessment showed that impingement of twaite shad consisted of 1,067 individuals (0.02% of the population). At 0.02% impingement of the SSB, it can be concluded that there would be no adverse effect on twaite shad and, therefore, no adverse effect on the integrity of the site. Twaite shad was not predicted to be at risk from entrainment (see **section 10.5 b i**) (Doc Ref 5.10), updated by **section 10.4** of the **Shadow HRA Addendum** (Doc Ref. 5.10Ad).

HRA Integrity Matrix D1.18: Elbe zwischen Geesthacht und Hamburg SCI

Name of European site and designation: Elbe zwischen Geesthacht und Hamburg SCI						
EU Code: DE2526332						
Distance to NSIP: 584 km						
European site features	**Adverse effect on integrity**					
Effect	Physical interaction between species and project infrastructure			In combination effects		
Stage of Development	*C*	*O*	*D*	*C*	*O*	*D*
1103 Twaite shad *Alosa fallax*		x **a**				

a. Physical interaction between species and project infrastructure: The SAC was assessed for impingement and entrainment effects from the Sizewell C Project on twaite shad. The assessment showed that impingement of twaite shad consisted of 1,067 individuals (0.02% of the population). At 0.02% impingement of the SSB, it can be concluded that there would be no adverse effect on twaite shad and, therefore, no adverse effect on the integrity of the site. Twaite shad was not predicted to be at risk from entrainment (see **section 10.5 b i**) (Doc Ref 5.10), updated by **section 10.4** of the **Shadow HRA Addendum** (Doc Ref. 5.10Ad).

HRA Integrity Matrix D1.19: Marais du Cotentin et du Bessin - Baie des Veys SAC

Name of European site and designation: Marais du Cotentin et du Bessin - Baie des Veys SAC						
EU Code: FR2500088						
Distance to NSIP: 396 km						
European site features	**Adverse effect on integrity**					
Effect	Physical interaction between species and project infrastructure			In combination effects		
Stage of Development	*C*	*O*	*D*	*C*	*O*	*D*
1103 Twaite shad *Alosa fallax*		x **a**				

a. Physical interaction between species and project infrastructure: The SAC was assessed for impingement and entrainment effects from the Sizewell C Project on twaite shad. The assessment showed that impingement of twaite shad would be very low in the context of the Scheldt and Elbe systems. The theoretical predicted impingement of twaite shad derived from the spawning populations of the Marais du Cotentin et du Bessin - Baie des Veys SAC can be assumed to be less significant than the predictions made in the context of the populations of the Scheldt and Elbe river systems. It can be concluded that there would be no adverse effect on twaite shad and, therefore, no adverse effect on the integrity of the site (see **section 10.4**) (Doc Ref. 5.10Ad).

HRA Integrity Matrix D1.20: Tregor Goëlo SAC

Name of European site and designation: Tregor Goëlo SAC						
EU Code: FR5300010						
Distance to NSIP: 532 km						
European site features	**Adverse effect on integrity**					
Effect	Physical interaction between species and project infrastructure			In combination effects		
Stage of Development	*C*	*O*	*D*	*C*	*O*	*D*
1103 Twaite shad *Alosa fallax*		x **a**				

a. Physical interaction between species and project infrastructure: The SAC was assessed for impingement and entrainment effects from the Sizewell C Project on twaite shad. The assessment showed that impingement of twaite shad would be very low in the context of the Scheldt and Elbe systems. The theoretical predicted impingement of twaite shad derived from the spawning populations of the Tregor Goëlo SAC can be assumed to be less significant than the predictions made in the context of the populations of the Scheldt and Elbe river systems. It can be concluded that there would be no adverse effect on twaite shad and, therefore, no adverse effect on the integrity of the site (see **section 10.4**) (Doc Ref. 5.10Ad).

HRA Integrity Matrix D1.21: Havre de Saint-Germain-sur-Ay et Landes de Lessay SAC

Name of European site and designation: Havre de Saint-Germain-sur-Ay et Landes de Lessay SAC						
EU Code: FR2500081						
Distance to NSIP: 632 km						
European site features	**Adverse effect on integrity**					
Effect	Physical interaction between species and project infrastructure			In combination effects		
Stage of Development	*C*	*O*	*D*	*C*	*O*	*D*
1099 River lamprey *Lampetra fluviatilis*		x **a**				

a. Physical interaction between species and project infrastructure: The impingement assessment predicts that 0.03% of the Humber run size for river lamprey would be impinged. For all other European sites, there is a weaker pathway for effect compared with the Humber Estuary SAC. It can be concluded there would not be an adverse effect on the integrity of the European site (**section 10.3, Shadow HRA Addendum,** Doc Ref. 5.10Ad).

HRA Integrity Matrix D1.22: Marais Vernier, Risle Maritime SAC

Name of European site and designation: Marais Vernier, Risle Maritime SAC						
EU Code: FR2300122						
Distance to NSIP: 389 km						
European site features	**Adverse effect on integrity**					
Effect	Physical interaction between species and project infrastructure			In combination effects		
Stage of Development	*C*	*O*	*D*	*C*	*O*	*D*
1099 River lamprey *Lampetra fluviatilis*		x **a**				

a. Physical interaction between species and project infrastructure: The impingement assessment predicts that 0.03% of the Humber run size for river lamprey would be impinged. For all other European sites, there is a weaker pathway for effect compared with the Humber Estuary SAC. It can be concluded there would not be an adverse effect on the integrity of the European site (**section 10.3, Shadow HRA Addendum,** Doc Ref. 5.10Ad).

HRA Integrity Matrix D1.23: Treene Winderatter See bis Friedrichstadt und Bollingstedter Au SAC

Name of European site and designation: Treene Winderatter See bis Friedrichstadt und Bollingstedter Au SAC						
EU Code: DE1322391						
Distance to NSIP: 615 km						
European site features	**Adverse effect on integrity**					
Effect	Physical interaction between species and project infrastructure			In combination effects		
Stage of Development	*C*	*O*	*D*	*C*	*O*	*D*
1099 River lamprey *Lampetra fluviatilis*		x **a**				

a. Physical interaction between species and project infrastructure: The impingement assessment predicts that 0.03% of the Humber run size for river lamprey would be impinged. For all other European sites, there is a weaker pathway for effect compared with the Humber Estuary SAC. It can be concluded there would not be an adverse effect on the integrity of the European site (**section 10.3, Shadow HRA Addendum,** Doc Ref. 5.10Ad).

HRA Integrity Matrix D1.24: Untereider SAC

Name of European site and designation: Untereider SAC						
EU Code: DE1719391						
Distance to NSIP: 593 km						
European site features	**Adverse effect on integrity**					
Effect	Physical interaction between species and project infrastructure			In combination effects		
Stage of Development	*C*	*O*	*D*	*C*	*O*	*D*
1099 River lamprey *Lampetra fluviatilis*		x **a**				

a. Physical interaction between species and project infrastructure: The impingement assessment predicts that 0.03% of the Humber run size for river lamprey would be impinged. For all other European sites, there is a weaker pathway for effect compared with the Humber Estuary SAC. It can be concluded there would not be an adverse effect on the integrity of the European site (**section 10.3, Shadow HRA Addendum,** Doc Ref. 5.10Ad).

HRA Integrity Matrix D1.25: Lesum SAC

Name of European site and designation: Lesum SAC						
EU Code: DE2818304						
Distance to NSIP: 566 km						
European site features	**Adverse effect on integrity**					
Effect	Physical interaction between species and project infrastructure			In combination effects		
Stage of Development	*C*	*O*	*D*	*C*	*O*	*D*
1099 River lamprey *Lampetra fluviatilis*		x **a**				

a. Physical interaction between species and project infrastructure: The impingement assessment predicts that 0.03% of the Humber run size for river lamprey would be impinged. For all other European sites, there is a weaker pathway for effect compared with the Humber Estuary SAC. It can be concluded there would not be an adverse effect on the integrity of the European site (**section 10.3, Shadow HRA Addendum,** Doc Ref. 5.10Ad).

HRA Integrity Matrix D1.26: Bremische Ochtum SAC

Name of European site and designation: Bremische Ochtum SAC						
EU Code: DE2918371						
Distance to NSIP: 572 km						
European site features	**Adverse effect on integrity**					
Effect	Physical interaction between species and project infrastructure			In combination effects		
Stage of Development	*C*	*O*	*D*	*C*	*O*	*D*
1099 River lamprey *Lampetra fluviatilis*		x **a**				

a. Physical interaction between species and project infrastructure: The impingement assessment predicts that 0.03% of the Humber run size for river lamprey would be impinged. For all other European sites, there is a weaker pathway for effect compared with the Humber Estuary SAC. It can be concluded there would not be an adverse effect on the integrity of the European site (**section 10.3, Shadow HRA Addendum,** Doc Ref. 5.10Ad).

HRA Integrity Matrix D1.27: Weser zwischen Ochtummündung und Rekum SAC

Name of European site and designation: Weser zwischen Ochtummündung und Rekum SAC						
EU Code: DE2817370						
Distance to NSIP: 552 km						
European site features	**Adverse effect on integrity**					
Effect	Physical interaction between species and project infrastructure			In combination effects		
Stage of Development	*C*	*O*	*D*	*C*	*O*	*D*
1099 River lamprey *Lampetra fluviatilis*		x **a**				

a. Physical interaction between species and project infrastructure: The impingement assessment predicts that 0.03% of the Humber run size for river lamprey would be impinged. For all other European sites, there is a weaker pathway for effect compared with the Humber Estuary SAC. It can be concluded there would not be an adverse effect on the integrity of the European site (**section 10.3, Shadow HRA Addendum,** Doc Ref. 5.10Ad).

HRA Integrity Matrix D1.28: Unterems und Außenems SCI

Name of European site and designation: Unterems und Außenems SCI						
EU Code: DE2507331						
Distance to NSIP: 400 km						
European site features	**Adverse effect on integrity**					
Effect	Physical interaction between species and project infrastructure			In combination effects		
Stage of Development	*C*	*O*	*D*	*C*	*O*	*D*
1099 River lamprey *Lampetra fluviatilis*		x **a**				

a. Physical interaction between species and project infrastructure: The impingement assessment predicts that 0.03% of the Humber run size for river lamprey would be impinged. For all other European sites, there is a weaker pathway for effect compared with the Humber Estuary SAC. It can be concluded there would not be an adverse effect on the integrity of the European site (**section 10.3, Shadow HRA Addendum,** Doc Ref. 5.10Ad).

HRA Integrity Matrix D1.29: Ems SCI

Name of European site and designation: Ems SCI						
EU Code: DE2809331						
Distance to NSIP: 463 km						
European site features	**Adverse effect on integrity**					
Effect	Physical interaction between species and project infrastructure			In combination effects		
Stage of Development	*C*	*O*	*D*	*C*	*O*	*D*
1099 River lamprey *Lampetra fluviatilis*		x **a**				

a. Physical interaction between species and project infrastructure: The impingement assessment predicts that 0.03% of the Humber run size for river lamprey would be impinged. For all other European sites, there is a weaker pathway for effect compared with the Humber Estuary SAC. It can be concluded there would not be an adverse effect on the integrity of the European site (**section 10.3, Shadow HRA Addendum,** Doc Ref. 5.10Ad).