The Sizewell C Project

9.63 Comments at Deadline 6 on Submission from Earlier Submissions and Subsequent Written Submissions to ISH1-ISH6 - Appendices

Revision: 1.0

Applicable Regulation: Regulation 5(2)(q)

PINS Reference Number: EN010012

August 2021

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

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APPENDIX A: NORTHERN PARK AND RIDE DRAINAGE DESIGN NOTE

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1 INTRODUCTION

1.1.1 NNB Generation Company (SZC) Limited (SZC Co.) submitted an application for a Development Consent Order (DCO) to the Planning Inspectorate under the Planning Act 2008 for the Sizewell C Project (referred to as the 'Application') in May 2020. The Application was accepted for examination in June 2020.

1.1.2 The northern park and ride development was originally submitted to the Planning Inspectorate (PINS) as part of the Application to build and operate a new nuclear power station to the north of Sizewell B.

1.1.3 SZC Co. has undertaken work to validate and develop the design of the northern park and ride that was originally submitted as part of the Application. This document forms one of a series of design validation and evolution documents being provided to the Examining Authority in support of the **Outline Drainage Strategy** [REP2-033].

1.1.4 The northern park and ride forms one of the Associated Developments (AD) which are required to mitigate traffic impacts arising from the main development site. The northern park and ride would be located alongside the A12 at Darsham. Its function would be to provide a transport hub from which construction workforce are driven to site by coach, thus reducing the construction traffic needing to access the main development site. Full details of its facilities are contained in **Volume 3 Northern Park and Ride Chapter 2 Description of the Northern Park and Ride** [APP-350] and are described in summary below.

1.1.5 The site would consist of workforce parking, welfare, security and amenity buildings. The workforce parking includes car parking spaces, accessible spaces, minibus/van spaces, pick up and motorcycle spaces.

1.1.6 The site access road and A12 roundabout would be designed to Suffolk County Council's (SCC) adoptable standards.

1.1.7 The northern park and ride site would generate surface water runoff from paved areas and roofs which would require to be removed, treated as necessary and disposed.

1.1.8 The site entrance and access from the A12 would generate highway runoff which would require to be removed, treated as necessary and disposed.

1.1.9 The northern park and ride welfare facilities would generate foul water flows which would require to be removed, treated as necessary and disposed.

1.1.10 The northern park and ride facility and its associated access and A12 road changes would remain in place and use during construction of the power station. Once construction is complete the site would be closed and decommissioned. It would then return to current agricultural use.

1.1.11 It is intended that the proposed access roundabout would be removed and the A12 would be returned to its current alignment.

2 PURPOSE

2.1.1 The **Outline Drainage Strategy** [REP2-033] identified at concept level the proposed drainage approach required for:

- The effective removal of highway and surface water runoff from the proposed northern park and ride, A12 roundabout and site access road, together with its treatment and disposal
- The effective removal of foul water generated by the workforce from the proposed northern park and ride.

2.1.2 The proposed drainage infrastructure was described in the concept drainage design submitted as part of the Application. This concept design was based on data and information available at that time. The design was supported by the submission of the **Northern Park and Ride Flood Risk Assessment** (FRA) [APP-115].

2.1.3 This concept drainage strategy was developed in consultation with drainage regulators and local authorities, including SCC and the Environment Agency (EA). The observations/requirements of drainage regulators were incorporated in the strategy.

2.1.4 The purpose of this technical note is to provide details of data which validates the Outline Drainage Strategy, a description of how the proposed concept drainage infrastructure is developing and evolving and to demonstrate that it continues to provide for the effective and satisfactory drainage of the northern park and ride and its associated external road modification, without unacceptable adverse impact on the water environment, both in terms of flood risk and pollution.

3 DESCRIPTION OF DCO DRAINAGE CONCEPT DESIGN

3.1.1 The northern park and ride concept drainage at DCO stage was developed by SZC Co. Proposals were developed for both the northern park and ride development site and associated modification of existing public highway required in order to provide access to and from the site.

3.1.2 Subject to achievable infiltration rates all surface water generated within the northern park and ride red line boundary would be contained within the site and discharged to ground. If necessary, excess runoff which couldn't infiltrate would be discharged to a local watercourse, located within the red line boundary, at pro rata greenfield rates.

3.1.3 External roads modified to access the site would discharge to swales and filter drains where they infiltrate to ground.

3.1.4 Traditional drainage with surface outlets, gullies, combined kerb drains (CKDs) etc would be provided at the A12 roundabout and discharge into the filter drains.

3.1.5 A final infiltration basin was proposed at the limit of the roundabout northern arm. This would collect and infiltrate runoff which is not removed by the swales and filter drains.

3.1.6 Although the presence of a public foul water sewer was identified located running along the A12, given its shallow depth it was considered that a gravity connection would not be possible. Accordingly, at that stage whilst retaining the theoretical option of discharging the site generated foul water to public sewer, the proposed infrastructure would be a local private foul water network discharging into a package sewage treatment plant. The treated effluent would discharge to ground by infiltration.

3.1.7 If the flow generation is too low or intermittent to be treated to the required standard or infiltration does not work, then a sealed tank (cess tank) would be provided with effluent being collected and removed by tanker for offsite treatment.

3.1.8 A single remote security cabin at the site entrance would drain to a septic tank with infiltration to ground. If infiltration rates are inadequate the septic tank would in effect become a cess tank.

3.1.9 The internal site layout showing the position of proposed swales, with potential outfall to watercourse and the sewage treatment plant is shown in **Plates 1** and **2** which are an extract from Application drawing **"Chapter 2 Description of the Northern Park and Ride** Figure 2.4" [APP-351].

Plate 1: Northern park and ride internal layout showing concept drainage infrastructure to the south

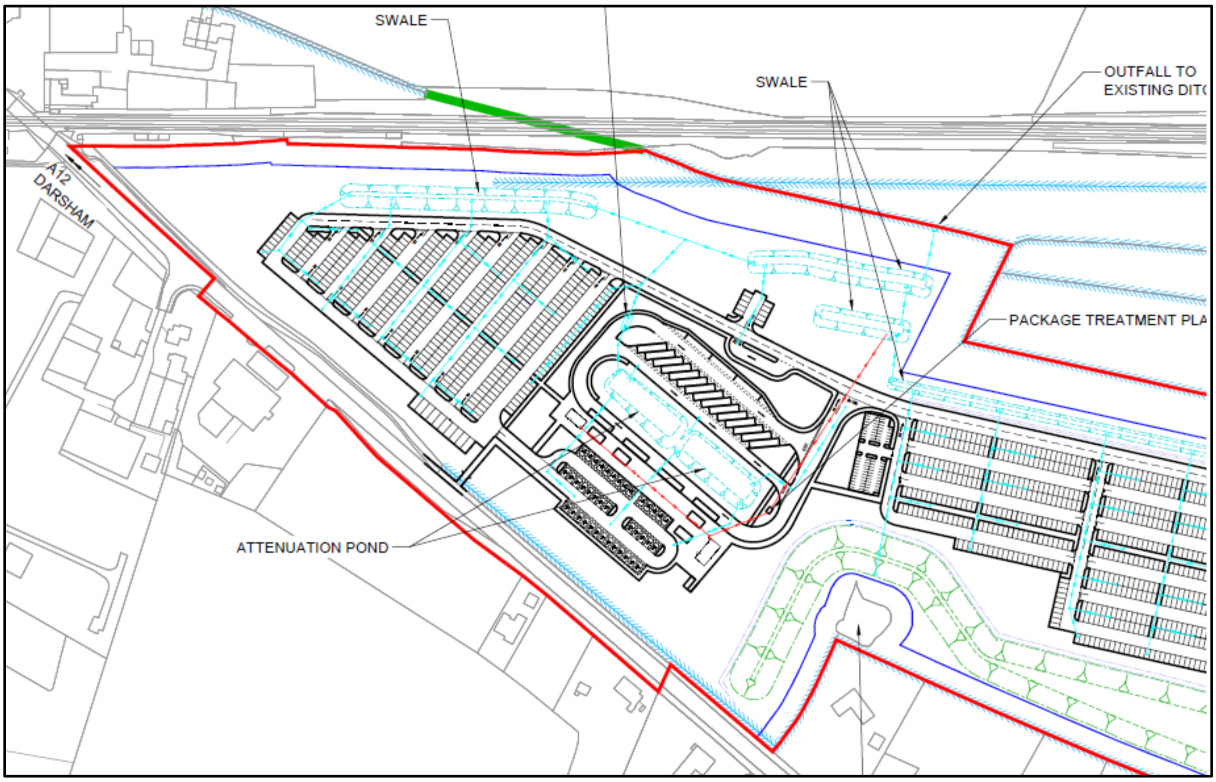
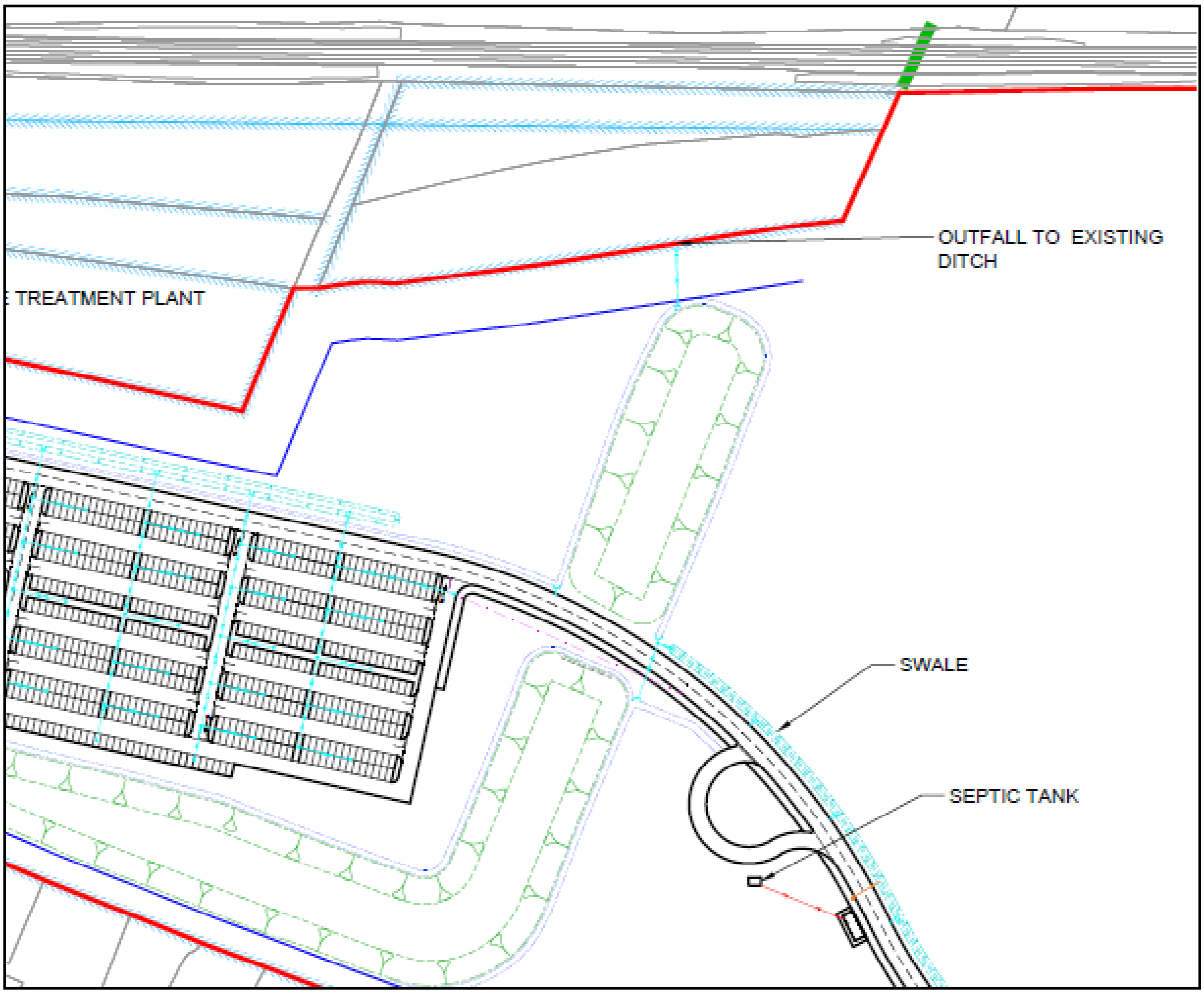
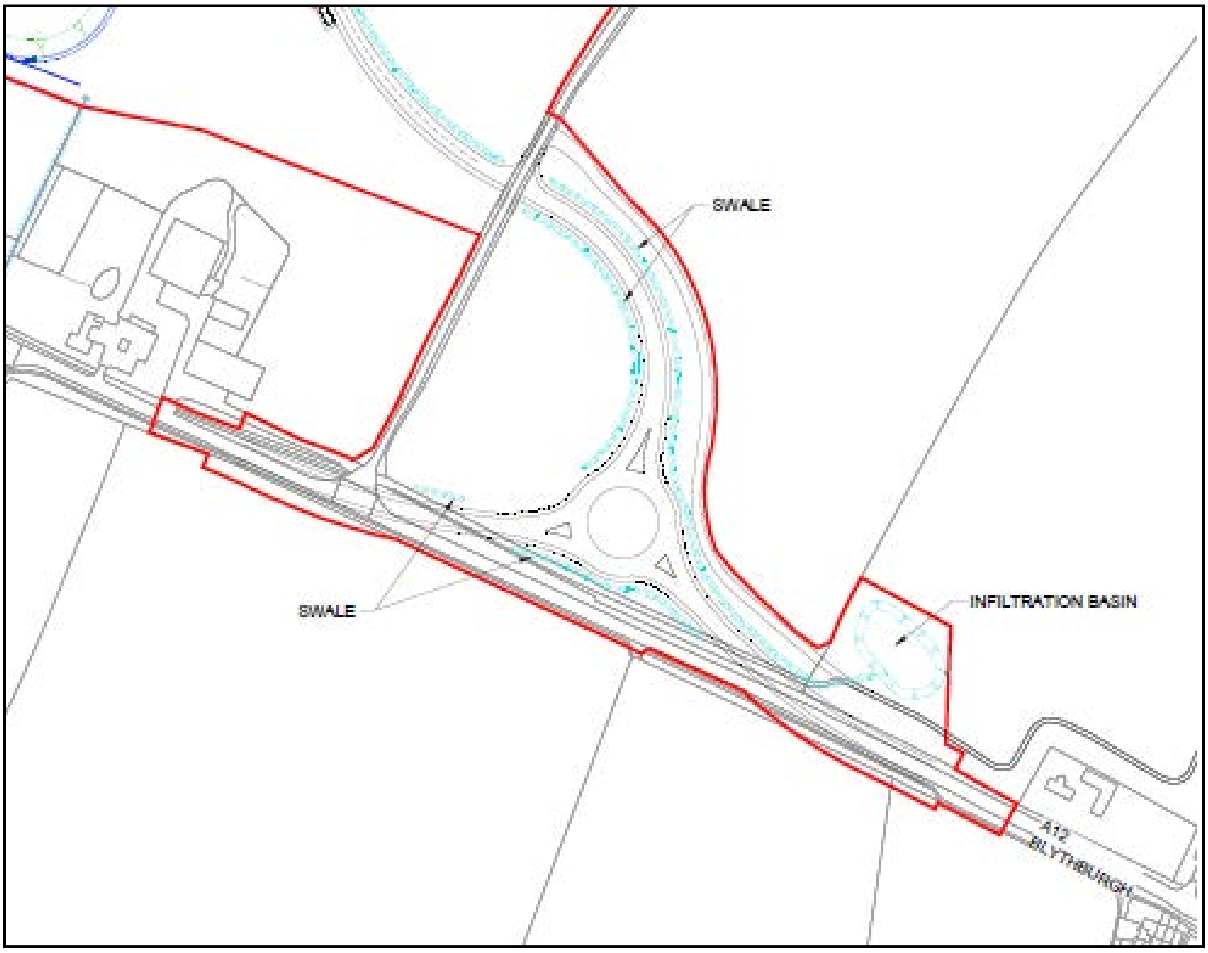


Plate 2: Northern park and ride internal layout showing concept drainage infrastructure to the north



3.1.10 The external site layout showing the road modifications with swales and infiltration basin is shown in **Plate 3**.

Plate 3: Northern park and ride external roads layout showing concept drainage infrastructure

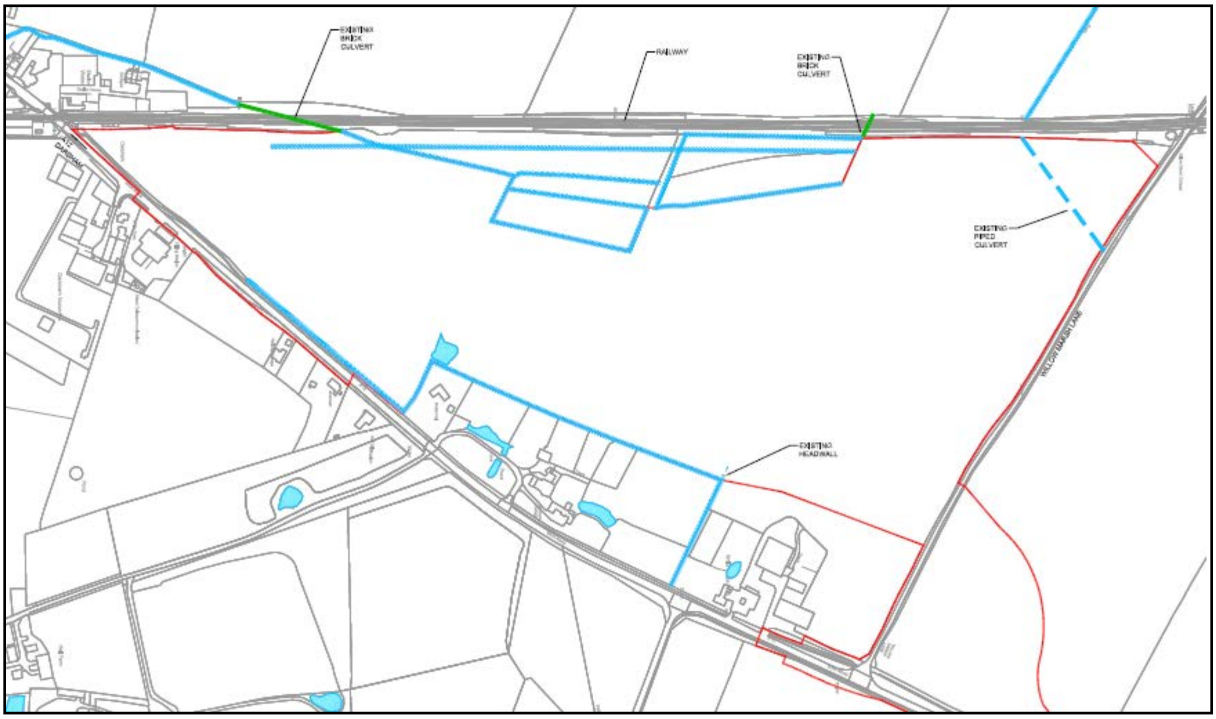


4 EXISTING SITE AND ADJACENT HIGHWAY DRAINAGE ARRANGEMENTS

4.1.1 Subsequent to development of the initial concept drainage strategy some site investigation had been undertaken both within and adjacent to the red line boundary. Elements of existing drainage infrastructure were identified but their function and condition are not fully understood.

4.1.2 Locations of drainage infrastructure are shown in **Plate 4** and are described below.

Plate 4: Northern park and ride existing drainage infrastructure



4.1.3 The extent of highway inspected is the A12 from the southern boundary of the site to Willow Marsh Lane and along Willow Marsh Lane alongside the northern site boundary. The A12 highway that continues to the north past the junction with Willow Marsh Lane and the location of the future roundabout was excluded from investigation.

4.1.4 It has been established that the northbound carriageway of the A12 has formal highway drainage with gulley outlets. These appear to discharge into a ditch located within the red line boundary and behind the highway boundary hedge. This ditch runs north and deviates west to run along the rear boundary of the properties Moat Hall, Darsham Cottage and White House Farm which front the road.

4.1.5 The ditch terminates in a small pond at the rear of White House Farm. The pond drains to an outfall pipe which appears to run in a westly direction and is assumed to cross the site to discharge into one of the ditches in the Little Nursery wood area.

4.1.6 Local ditches exist on either side of Willow Marsh Lane and run to the west before discharging into a culvert which cuts across the corner within the site before appearing to discharge into a watercourse at the railway boundary.

4.1.7 There are a series of ditches and watercourse that run mostly between the red line boundary and the railway and these run south towards Darsham station before passing under the railway to the west in a culvert.

4.1.8 As shown in **Plate 5**, the Environment Agency Surface Water Flood Map predicts that there is a medium to high risk of flooding of the site from these ditches and watercourses, within the site adjacent to the western boundary.

Plate 5: northern park and ride Western Boundary Surface Water Flood Risk Locations

4.1.9 No detailed site inspection of the A12 to the north of Willow Marsh Lane has been undertaken. However, based on remote inspection of the A12 using Google Streetview there is no sign of obvious highway drainage infrastructure.

4.1.10 The Environment Agency Surface Water Flood Map shows predicted flooding of the land to the west of the A12 and across the A12. The extent is shown in **Plate 6**.

Plate 6: A12 predicted surface water flood risk locations at roundabout northern tie in

4.1.11 It appears that the land to the west of the A12 is at a lower level such that the A12 forms a barrier. Overland flow from fields to the west builds up and is predicted to overflow across the road and then follow the field boundary on the east of the A12 before discharging into a watercourse located within 150 m of the A12.

4.1.12 It is possible that there is a field boundary ditch but this needs to be confirmed by site inspection. A site inspection would also confirm if there is a culvert crossing beneath the A12.

5 REVISED DRAINAGE DESIGN STRATEGY INPUT DATA

5.1.1 The concept design which was included in the original DCO drainage design has been developed based on the DCO drainage design strategy but modified to take account of data which has become available since the Application.

5.1.2 The new data which informs the design development is listed below:

- Ground Investigation and infiltration testing undertaken in May 2020
- Site visit and inspection of northern park and ride extent

5.1.3 There is no new data in respect of the highway modifications with site access road and A12 roundabout to the north.

6 GROUND INVESTIGATION AND INFILTRATION TESTING RESULTS

6.1.1 Three trial pits were excavated within the site at locations shown in **Plate 7**.

Plate 7: Northern park and ride site infiltration test trial holes

Locations

6.1.2 The nature of the strata was confirmed to be Lowestoft Formation which is a stiff but slightly gravelly clay. A single BRE365 (Ref. 1) infiltration test was carried out at each location. Since there was no discernible drop in water in the trial pit over 24 hours, second and third tests were not undertaken.

6.1.3 These results clearly demonstrate that infiltration is not viable and therefore surface water runoff from the development site must be disposed to the available watercourse to the west of the site, within the red line boundary.

7 REVISED SURFACE WATER CONCEPT DRAINAGE DESIGN

7.1.1 The surface water arrangements for removal remain as broadly as described in **Volume 3 Northern Park and Ride Chapter 2 Description of the Northern Park and Ride** [APP-350] but are modified to take account of the infiltration test results obtained in May 2020 and the site inspection.

7.1.2 Runoff from roofs would be drained via downpipes and gullies, as appropriate to underground carrier drains and discharge into attenuation basins and swales.

7.1.3 Runoff from the internal roads and the bus/HGV standing areas with impermeable surface would be drained via surface outlets, gullies, linear channels and drains etc. These would discharge into underground carrier drains which would convey the runoff to the same attenuation basins and swales.

7.1.4 Bypass interceptors would be installed downstream of the bus/HGV standing areas in order to remove hydrocarbon and silt contaminants which would improve the water quality of discharge to the attenuation basins and swales.

7.1.5 The extensive car parking areas would have a permeable surface allowing runoff to permeate into and be temporarily stored in the sub-base. This would assist with attenuating peak flow rate, provide some storage and initial treatment of the runoff. The sub-base would allow flow to drain into the carrier drains.

7.1.6 The underground carrier drains would discharge all surface water into a series of cascading attenuation basins and swales which would provide suitable final treatment in accordance with CIRIA C753 The SuDS Manual (Ref. 2). They would also provide attenuation storage for all runoff required in order that discharge to watercourse from the site is limited to the equivalent greenfield runoff.

7.1.7 Initial calculations for the required total attenuation storage volume are shown in **Table 1**. These assume a controlled discharge rate to the watercourse at a 1 in 100 year return period greenfield runoff rate.

Table 1: Northern park and ride flow control rates and storage volumes

Parameters	Values
Estimated Qbar rate	39.75 l/sec
Proposed Discharge Rate; Greenfield 1 in 100 +40 %cc	141.5 l/sec
Proposed Attenuation Storage Volume 1 in 100 +40 %cc	4,253 m^3

7.1.8 Upon review it is noted that a discharge rate based on 1 in 100 year return period greenfield runoff rate would not be compliant with SCC policy which is based on permitting a discharge rate from new development to watercourse set at Qbar or 2 l/s/Ha.

7.1.9 Hydraulic modelling calculations have been undertaken to determine a required attenuation storage volume if the discharge rate is limited to Qbar. The calculations are shown in **Appendix B**. The required storage is 8,700 m^3 which is an increase of 200% on the concept design. However as shown in a copy of the site layout plan in **Appendix A** this volume represents a very small proportion of the site and would be accommodated within the Order Limits, enabling the appropriate discharge rate to be met. The plan areas shown are for illustrative purposes only and do not represent the fixed or final position of the attenuation storage positions.

7.1.10 The layout drawing shown in **Appendix A** continues to show an infiltration basin within the developed area and swales between the developed area and the watercourse to the west. The infiltration basin would become an attenuation basin. It is intended that the additional required storage would include these features but more swales and basins would be required.

7.1.11 The proposed design assumes a free outfall to the watercourse within the western area of the site and no increased flood risk from the watercourse, but this would require to be confirmed.

7.1.12 **Plate 5** shows the Environment Agency surface water flood map and indicates the area adjacent to the watercourse to be at risk of flooding due to a 1 in 30 year return period event. As a result, it cannot be assumed that there would be a free outfall. The site topography survey shows a fall of level towards the watercourse but does not include watercourse levels. The depth of the watercourse is not determined.

7.1.13 The position of the attenuation facilities and levels of outfall connections to the watercourse would need to be set to ensure no risk of flooding within the site or increase of flood risk to 3rd party land and to ensure a free outfall with no impact on flow control devices.

8 REVISED FOUL WATER CONCEPT DRAINAGE DESIGN STRATEGY – PARK AND RIDE

8.1.1 The foul water drainage strategy remains unchanged with foul water flows collected by an underground gravity pipe drainage network and discharged into a package sewage treatment plant. However, whilst previously the treated effluent would discharge to ground via infiltration through a drainfield network, the infiltration test results demonstrate that this is not feasible. Therefore, the treated effluent would need to discharge to the watercourse via the surface drainage network.

8.1.2 The implications of a change to discharge the sewage treatment plant flows to the watercourse is that the package treatment plant may be required by the EA to deliver an enhanced treatment to achieve higher quality of treated effluent. Alternatively, instead of or in addition to an enhanced treatment within the sewage treatment plant, an additional treatment train infrastructure could be considered during preliminary design, for example reed beds could be installed downstream.

8.1.3 Given that that foul water flow rates generated would be low and intermittent with a range of flow it may make the delivery of a consistent treated effluent to meet the requirements of the required environmental permit more challenging. If a suitable package plant and associated treatment infrastructure cannot be developed during preliminary design or consent to a discharge of treated effluent to watercourse cannot be agreed, the alternative would be to collect the foul water sewage in an underground sealed cess tank from which it can be collected and regularly removed by tanker for treatment offsite.

8.1.4 The remote security cabin arrangement of discharge into a septic tank would remain. Solids would be collected in the tank and removed by tanker for treatment offsite. Liquid effluent would discharge to ground via a drainfield network. The drainfield typically consists of an arrangement of trenches containing perforated pipes and porous material (often gravel) covered by a layer of soil to prevent animals (and surface runoff) from reaching the wastewater distributed within those trenches.

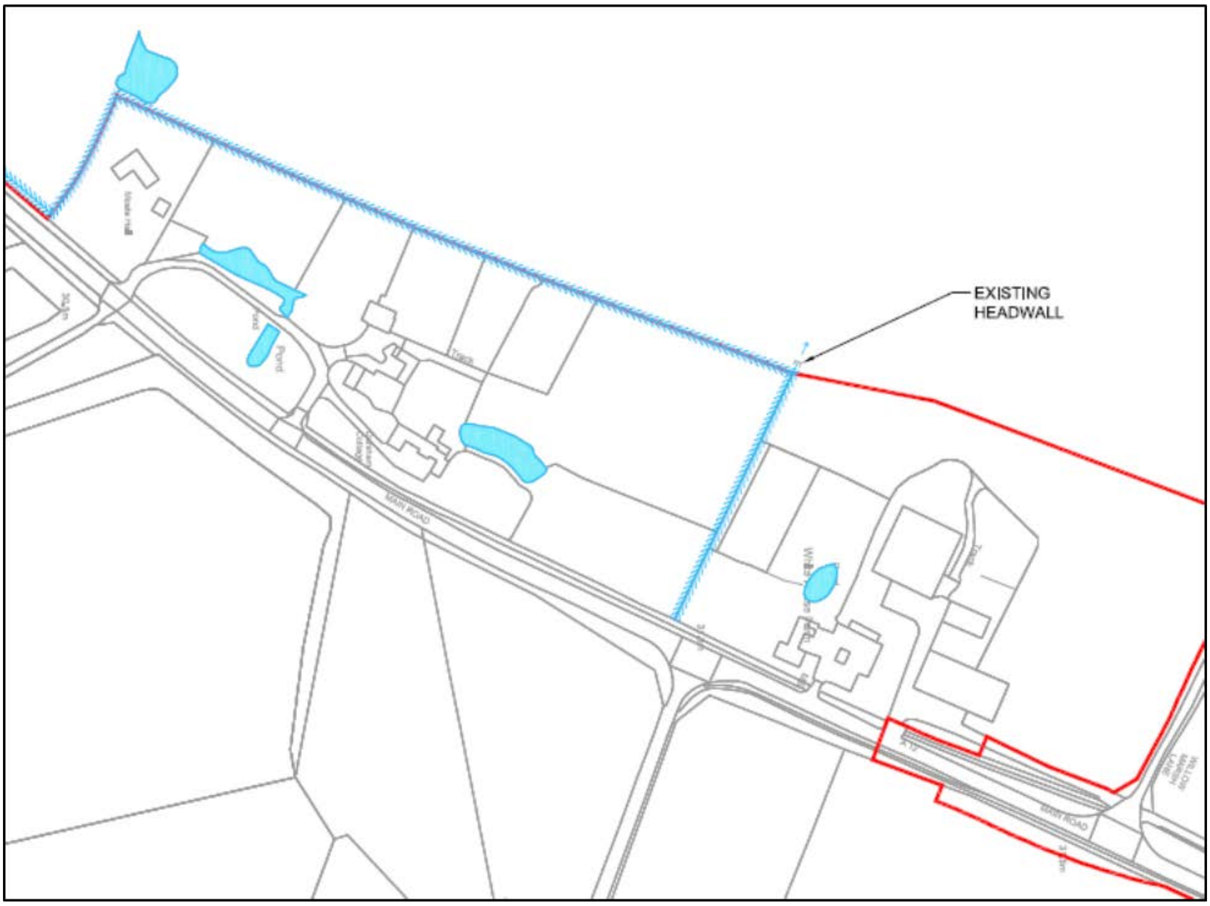
8.1.5 During design development should it be determined that the infiltration rate is insufficient for the provision of a drainfield and therefore creating a flood risk, it would be necessary to collect wastewater and sewage in a cesspit from which it can be collected and regularly be removed by tanker for treatment offsite or at the site treatment plant, if that option is pursued.

9 PROTECTION OF EXISTING DRAINAGE

9.1.1 As noted in Section 4 there is an existing ditch network within the site boundary and this provides an outfall for runoff from the A12 highway and also it is believed an outfall for the properties to the west of the A12. The site layout would be modified to ensure that this arrangement remains in place and removal of runoff is not impeded. The 3 m high bund which is provided to minimise impact on the local properties would be moved into the site by such distance as is required in order to provide access to and maintain the existing ditch along the eastern site boundary.

9.1.2 The existing pond outfall ditch runs along behind the properties and terminates at an existing headwall as shown in Plate 8.

Plate 8: Northern park and ride existing drainage and outfall headwall



9.1.3 The headwall outfall drain appears to run west and across the site where it is assumed there is discharge to the watercourse. This outfall drain is within the part of the site which is undeveloped and should remain as grassland. As a result, the drain should be able to remain in place and used as at present. However, it would be crossed by the site access road so its location, depth and structural condition will need to be confirmed and, if necessary, the outfall drain would be replaced.

9.1.4 The existing ditches which run alongside Willow Marsh Lane would be retained and discharge to an existing retained culvert that passes through the north western part of the site. The existing ditches would be culverted where they cross the northern park and ride access road.

10 REVISED SURFACE WATER CONCEPT DRAINAGE DESIGN STRATEGY – A12 ROUNDABOUT AND MAIN SITE ACCESS ROAD

10.1.1 The surface water drainage strategy for the highway drainage subject to adoption by SCC remains unchanged being infiltration to ground to the extent that this is achievable. Within the proposed A12 roundabout highway, runoff would be collected by surface water outlets, gullies and CKDs into carrier drains which would discharge to swales located adjacent to the 3 arms of the roundabout. The three arms of the roundabout would drain “over the edge” to swales. The swales would have an underlying filter drain which may partially infiltrate to ground before discharging to the proposed infiltration basin adjacent the roundabout. Dependent on topography and the bed level, the site access road arm may in part discharge to the existing adjacent ditches along Willow Marsh Lane.

10.1.2 The swales would have a continuous fall to the infiltration basin. The required size of the basin would be determined at preliminary design stage by hydraulic modelling using infiltration results of future testing at this location.

10.1.3 Although no infiltration testing has been undertaken in vicinity to the infiltration basin, given the results of testing within the development site it is likely that infiltration would not be viable. This will need to be confirmed by testing.

10.1.4 On the basis that infiltration would not be viable, the infiltration basin would change to an attenuation basin with a positive outfall. The basin outfall would pass under the A12 and along the field boundary to the existing watercourse located within 150 m. A culvert beneath the road and boundary ditch may already exist and be capable of being utilised but this will be confirmed by future site visit. Hydraulic calculations have been undertaken to establish the required attenuation basin storage volume and are shown in **Appendix C**. The required footprint for the basin is shown in **Appendix A.**

10.1.5 In summary, based on Qbar calculated as being 4.6 l/s and assuming a tank with a depth of 1.5 m and vertical sides, the storage volume required would be 975 m3 which is less than the footprint for the basin shown at concept design stage. The attenuation would be constructed in the form of an open basin in order to intercept overland flow from adjacent land. This would ensure that the currently predicted surface water flood risk to the A12 due to overland flow from adjacent land is mitigated including allowance for climate change.

11 SUMMARY AND CONCLUSION

11.1.1 The purpose of this technical note is to validate the Outline Drainage Strategy for the northern park and ride. It describes how the concept design has needed to evolve as a result of provision of new information and design development.

11.1.2 The drainage design for both the internal northern park and ride facility and A12 roundabout modification and site access road have been developed to a level of detail to provide sufficient evidence of an achievable drainage strategy that is compliant with national planning and environmental regulatory requirements.

11.1.3 Subject to the results of DCO examination and acceptance of the drainage design strategy principles contained in this report, the drainage designs would be developed to preliminary design stage.

11.1.4 The northern park and ride facility drainage design will be based on CIRIA C753, SuDS Manual, Design and Construction Guidance for Foul and Surface Water Sewers (formerly Sewers for Adoption) (Ref. 3), and PPG4 Treatment and Disposal of Sewage where no Foul Water Sewer is Available (Ref. 4).

11.1.5 The adoptable highway drainage design would be based on Design Manual for Roads and Bridges (DMRB) (Ref. 5), Manual of Contract Documents for Highway Works (MCHW) (Ref. 6) and SCC specific guidance (Refs. 7 and 8).

11.1.6 As preliminary design progresses SZC Co. will liaise with SCC and the EA through design review meetings to achieve acceptance of the drainage infrastructure and to enable compliance with regulatory requirements and environmental permits.

REFERENCES

1. BRE Digest Soakaway design: DG 365 – 2016, BRE, 2016 https://www.brebookshop.com/details.jsp?id=327592

2. The SUDs Manual (C753), CIRIA, 2015, ISBN 978-0-86017-760-9.

3. SSG Appendix C - Design and construction guidance for foul and surface water sewers offered for adoption under the Code for adoption agreements for water and sewerage companies operating wholly or mainly in England ("the Code"). Approved Version 2.0. 10 March 2020. Water UK. https://www.thenbs.com/PublicationIndex/documents/details?DocID=330727

4. Pollution Prevention Guidelines PPG4: Treatment and disposal of sewage where no foul sewer is available, Environment and Heritage Service / Scottish Environment Protection Agency / Environment Agency, July 2006. PMHO0706BJGL-E-E. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/485181/pmho0706bjgl-e-e.pdf

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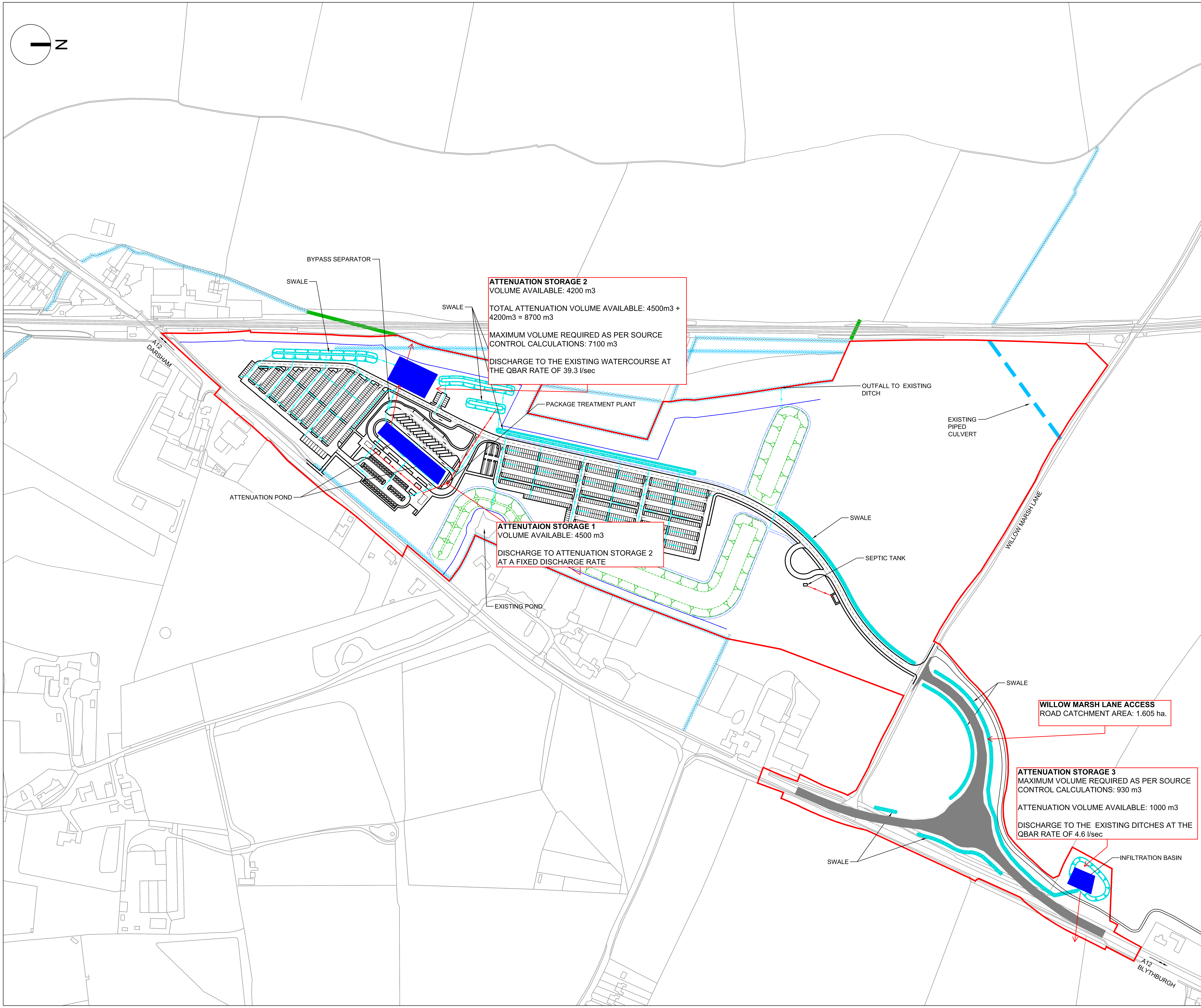
6. Manual of Contract Documents for Highway Works (MCHW), Highways Agency. https://www.standardsforhighways.co.uk/ha/standards/mchw/index.htm

7. Design Guide, Suffolk County Council, 2000, https://www.suffolk.gov.uk/planning-waste-and-environment/planning-and-development-advice/suffolk-design-guide-for-residential-areas/

8. Sustainable Drainage Systems (SuDS) a Local Design Guide Appendix A to the Suffolk Flood Risk Management Strategy, Suffolk County Council, May 2018 https://www.greensuffolk.org/app/uploads/2021/05/2018-10-01-SFRMS-SuDS-Guidance-Appendix-A-.pdf

APPENDIX A: LAYOUT PLAN SHOWING ATTENUATION STORAGE REQUIREMENTS



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NOTES:

1. Do not scale from this drawing. All dimensions are in metres unless noted otherwise.

KEY

- DEVELOPMENT SITE BOUNDARY
- BUFFER ZONE
- SWALE / INFILTRATION BASIN (INDICATIVE)
- LANDSCAPE BUND
- PROPOSED SURFACE WATER DRAINAGE (INDICATIVE)
- PROPOSED FOUL WATER DRAINAGE (INDICATIVE)
- PROPOSED DITCH (INDICATIVE)
- EXISTING DITCH / WATER COURSE
- EXISTING BRICK CULVERT
- PROPOSED BYPASS SEPARATOR (INDICATIVE)
- EXISTING PIPED CULVERT

NOT FOR CONSTRUCTION

NOT FOR APPROVAL

REV.	DATE	PREPARED BY	CHECKED BY	STATUS	REASONS FOR REVISION	APPROVED BY
H	12.06.20	AB	KA	S3	MINOR AMENDMENTS FOLLOWING INFILTRATION TESTS	PJ
G	21.02.20	NKS	KA	S3	MINOR AMENDMENTS FOLLOWING HSF REVIEW	PJ
F	10.01.20	NKS	KA	S3	MINOR AMENDMENTS FOLLOWING HSF REVIEW	PJ
E	12.11.19	NKS	KA	S3	MINOR AMENDMENTS FOLLOWING QUOD REVIEW	PJ
D	31.10.19	NKS	KA	S3	MINOR AMENDMENTS FOLLOWING TEAM REVIEW	PJ
C	24.09.19	NKS	KA	S3	UPDATED WSP DESIGN ADDED.	PJ
B	24.07.19	NKS	KA	S3	MINOR AMENDMENTS	PJ
A	09.07.19	NKS	KA	S3	FIRST ISSUE	PJ

NNB GenCo
EDF ENERGY

1st partner: EDF ENERGY
2nd partner: NNB GENCO

CONTRACTOR COMPANY TRADE NAME : ROYAL HASKONINGDHV

CONTRACTOR REF. No. PB7869

CONTRACT NUMBER : SZ0204

CONTRACTOR WBS CODE : N/A

QRA RELATED Yes ☐ No ☒

APPLICABILITY:
1: Document related to Unit 1
2: Document related to Unit 2
9: Document that applies to buildings/systems common to Unit 1 & 2
0: Documents that relate exclusively to buildings or systems that are common to the whole site (e.g. parking, ancillary buildings...)

NUCL/REP/EPR/UKX							
HPC (doc: HK)				SZC (doc: SZ)			
0	1	2	9	0	1	2	9

BUILDING
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SYSTEM
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SCALE
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SIZE A1

PAGE
1/1

DESCRIPTION

SIZEWELL C
NORTHERN PARK AND RIDE SITE
DRAINAGE LAYOUT

DOCUMENT REFERENCE No.

SZC	SZ0204	FP	000	DRW	100045
Project	Contract No. / Orig. Co	Asset / Zone	System / Building	Doc. type	Chrono No.

DOCUMENT SUB -TYPE
N/A

EDF CLASSIFICATION CODE
N/A

SUBCONTRACTOR COMPANY TRADE NAME
N/A

SUBCONTRACTOR DOCUMENT REF. No
N/A

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APPENDIX B: MAIN DEVELOPMENT ATTENUATION STORAGE REQUIREMENTS

ICP SUDS Mean Annual Flood

Input

Return Period (years)	2	SAAR (mm)	600	Urban	0.000
Area (ha)	13.850	Soil	0.400	Region Number	Region 5

Results	**l/s**
QBAR Rural	39.3
QBAR Urban	39.3
Q2 years	35.2
Q1 year	34.2
Q30 years	94.5
Q100 years	140.1

APPENDIX C: A12 ACCESS ROUNDABOUT ATTENUATION STORAGE REQUIREMENTS

ICP SUDS Mean Annual Flood

Input

Return Period (years)	2	SAAR (mm)	600	Urban	0.000
Area (ha)	1.605	Soil	0.400	Region Number	Region 5

Results	**l/s**
QBAR Rural	4.6
QBAR Urban	4.6
Q2 years	4.1
Q1 year	4.0
Q30 years	11.0
Q100 years	16.2

Summary of Results for 100 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	25.786	0.436	4.6	283.6	O K
30 min Summer	25.920	0.570	4.6	370.6	O K
60 min Summer	26.057	0.707	4.6	459.4	O K
120 min Summer	26.191	0.841	4.6	546.3	O K
180 min Summer	26.262	0.912	4.6	592.5	O K
240 min Summer	26.306	0.956	4.6	621.3	O K
360 min Summer	26.357	1.007	4.6	654.5	O K
480 min Summer	26.387	1.037	4.6	674.0	O K
600 min Summer	26.403	1.053	4.6	684.6	O K
720 min Summer	26.411	1.061	4.6	689.5	O K
960 min Summer	26.409	1.059	4.6	688.6	O K
1440 min Summer	26.377	1.027	4.6	667.5	O K
2160 min Summer	26.324	0.974	4.6	633.4	O K
2880 min Summer	26.273	0.923	4.6	600.2	O K
4320 min Summer	26.175	0.825	4.6	536.2	O K
5760 min Summer	26.070	0.720	4.6	468.1	O K
7200 min Summer	25.967	0.617	4.6	401.3	O K
8640 min Summer	25.880	0.530	4.6	344.8	O K
10080 min Summer	25.806	0.456	4.6	296.4	O K
15 min Winter	25.839	0.489	4.6	318.1	O K
30 min Winter	25.990	0.640	4.6	416.0	O K
60 min Winter	26.144	0.794	4.6	516.3	O K
120 min Winter	26.295	0.945	4.6	614.2	O K
180 min Winter	26.376	1.026	4.6	667.1	O K
240 min Winter	26.428	1.078	4.6	700.4	O K
360 min Winter	26.489	1.139	4.6	740.0	O K
480 min Winter	26.526	1.176	4.6	764.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	95.856	0.0	269.8	26
30 min Summer	62.839	0.0	344.1	41
60 min Summer	39.255	0.0	463.4	70
120 min Summer	23.708	0.0	557.4	130
180 min Summer	17.426	0.0	611.2	190
240 min Summer	13.928	0.0	647.0	248
360 min Summer	10.099	0.0	689.6	368
480 min Summer	8.044	0.0	705.4	486
600 min Summer	6.737	0.0	704.2	604
720 min Summer	5.827	0.0	699.2	724
960 min Summer	4.630	0.0	685.5	962
1440 min Summer	3.344	0.0	654.7	1262
2160 min Summer	2.411	0.0	1036.5	1644
2880 min Summer	1.910	0.0	1092.0	2044
4320 min Summer	1.373	0.0	1156.3	2864
5760 min Summer	1.086	0.0	1252.2	3688
7200 min Summer	0.904	0.0	1303.4	4400
8640 min Summer	0.778	0.0	1345.6	5112
10080 min Summer	0.686	0.0	1380.2	5856
15 min Winter	95.856	0.0	300.4	26
30 min Winter	62.839	0.0	369.7	41
60 min Winter	39.255	0.0	518.0	70
120 min Winter	23.708	0.0	620.5	128
180 min Winter	17.426	0.0	675.4	186
240 min Winter	13.928	0.0	705.1	244
360 min Winter	10.099	0.0	718.5	360
480 min Winter	8.044	0.0	715.9	478

Summary of Results for 100 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
600 min Winter	26.548	1.198	4.6	778.5	O K
720 min Winter	26.560	1.210	4.6	786.5	Flood Risk
960 min Winter	26.566	1.216	4.6	790.4	Flood Risk
1440 min Winter	26.539	1.189	4.6	773.0	O K
2160 min Winter	26.471	1.121	4.6	728.6	O K
2880 min Winter	26.406	1.056	4.6	686.2	O K
4320 min Winter	26.269	0.919	4.6	597.3	O K
5760 min Winter	26.126	0.776	4.6	504.6	O K
7200 min Winter	25.960	0.610	4.6	396.7	O K
8640 min Winter	25.831	0.481	4.6	312.9	O K
10080 min Winter	25.728	0.378	4.6	245.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
600 min Winter	6.737	0.0	710.7	592
720 min Winter	5.827	0.0	704.8	708
960 min Winter	4.630	0.0	693.1	932
1440 min Winter	3.344	0.0	670.9	1364
2160 min Winter	2.411	0.0	1159.2	1716
2880 min Winter	1.910	0.0	1218.7	2172
4320 min Winter	1.373	0.0	1232.6	3116
5760 min Winter	1.086	0.0	1402.5	4040
7200 min Winter	0.904	0.0	1460.1	4752
8640 min Winter	0.778	0.0	1507.7	5448
10080 min Winter	0.686	0.0	1547.1	6064

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.400	Shortest Storm (mins)	15
Ratio R	0.405	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 1.605

Time From:	**(mins) To:**	**Area (ha)**	**Time From:**	**(mins) To:**	**Area (ha)**	**Time From:**	**(mins) To:**	**Area (ha)**
0	4	0.535	4	8	0.535	8	12	0.535

Model Details

Storage is Online Cover Level (m) 26.850

Tank or Pond Structure

Invert Level (m) 25.350

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	650.0	1.500	650.0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0098-4600-1200-4600
Design Head (m)	1.200
Design Flow (l/s)	4.6
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	98
Invert Level (m)	25.350
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	4.6	Kick-Flo®	0.744	3.7
Flush-Flo™	0.357	4.6	Mean Flow over Head Range	-	4.0

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.2	0.800	3.8	2.000	5.8	4.000	8.1	7.000	10.5
0.200	4.3	1.000	4.2	2.200	6.1	4.500	8.5	7.500	10.9
0.300	4.6	1.200	4.6	2.400	6.4	5.000	9.0	8.000	11.2
0.400	4.6	1.400	4.9	2.600	6.6	5.500	9.4	8.500	11.6
0.500	4.5	1.600	5.3	3.000	7.1	6.000	9.8	9.000	11.9
0.600	4.3	1.800	5.6	3.500	7.6	6.500	10.2	9.500	12.2

APPENDIX B: IN-COMBINATION IMPACTS OF LIGHT AND NOISE ON BATS

CONTENTS

TABLES

APPENDICES

None Provided.

1 INTRODUCTION

1.1.1 This note has been prepared to address the following issue identified by East Suffolk Council and Suffolk County Council within their Joint Local Impact Report in paragraph 8.74 [REP1-045] and similar concerns raised by the RSPB and SWT at paragraph 3.727 in their joint Written Representation [REP2-506], which states:

"*Of additional particular concern is the fact that construction noise and lighting have the potential to adversely impact the mitigation measures being put in place to address impacts arising from fragmentation of connectivity due to habitat loss*."

2 SZC CO.'S RESPONSE

2.1.1 A standardised approach to the assessment of inter-relationship effects has been taken across the each of the terrestrial ecology and ornithology assessments presented within the **ES** that follows the methods of assessment set out within **Volume 1, Chapter** 6 [APP-177] and the terrestrial ecology and ornithology Specific assessment methodology in **Volume 1 Appendix 6J** [APP-171].

2.1.2 The assessment presented considers the magnitude of impacts and value/sensitivity of resources/receptors that could be affected in order to classify effects. In the case of the inter-relationship assessment, consideration has been given to the combined magnitude of the different impacts of the proposed development on an individual important ecological feature to identify the inter-relationship effect on the important ecological feature.

2.1.3 Inter-relationship effects are known to be difficult to quantify, and in respect of bats several approaches have been employed to ensure potential impacts are mitigated and then to draw assessment conclusions.

2.1.4 It is asserted that the assessment to date is robust and captures the likely significant impacts of noise and lighting, both in isolation and in-combination.

2.1.5 This is outlined in this written response and is based around the points below:

- Point 1 - A standardised and robust approach is taken when assessing likely impacts resulting from factors such as noise and light and these are assessed in-combination in relation to the likely effect, i.e. does the in combination impact result in fragmentation for example. This takes into account the robust mitigation proposed.

- Point 2 - Insofar as is possible, real world data from a comparable site (Hinkley Point C) has been used to identify in-combination effects in a real-world situation.
- Point 3 - Additional habitats have been created and are proposed to be created for bats which will not be impacted by light or noise, providing additional areas of foraging to minimise the potential effect of foreseen and unforeseen impacts. These areas further reduce the potential for a significant in-combination impact upon bat populations.
- Point 4 - A robust suite of monitoring is proposed which will allow any unforeseen in-combination impacts to be identified and addressed
- Point 5 - High levels of lighting and noise control mitigation is secured, which reduce the potential for simultaneous occurrences of high noise and light levels. This further reduced the potential for in-combination impacts. The assessment of noise is a precautionary assessment which likely overestimates the potential impacts.
- Point 6 - Overlays of noise and light show that the areas of the site where there is potential for in-combination effects on areas sensitive for bats are very limited. This is presented graphically in a number of figures.

2.1.6 Each of these aspects is addressed separately below.

2.2 Point 1

2.2.1 For each impact and for all sites, mitigation is proposed to reduce the resultant effect to a level at which individual impacts are not considered likely to have a significant effect. This is presented in **Table 2-1** below.

Table 2-1: Summary of impact Assessment of light and noise in combination

Impact		Construction Years 0 -12	Operation Years 12+
Barbastelle	Lighting disturbance.	Minor adverse (not significant).	Minor adverse (not significant).
Barbastelle	Noise disturbance.	Minor adverse (not significant).	No residual impact
Natterer’s bat	Lighting disturbance.	Minor adverse (not significant).	Minor adverse (not significant).
Natterer’s bat	Noise disturbance.	Minor adverse (not significant).	No residual impact

Impact		Construction Years 0 -12	Operation Years 12+
Leisler's bat and Nathusius' pipistrelle	Lighting disturbance.	Negligible adverse (not significant).	Negligible adverse (not significant).
Leisler's bat and Nathusius' pipistrelle.	Noise disturbance.	Negligible adverse (not significant).	No residual impact
Noctule and serotine	Lighting disturbance.	Minor adverse (not significant).	Minor adverse (not significant).
Noctule and serotine	Noise disturbance.	Negligible adverse (not significant).	No residual impact
Daubenton's bat, brown long-eared bat, common pipistrelle and soprano pipistrelle.	Lighting disturbance.	Minor adverse (not significant).	Minor adverse (not significant).
Daubenton's bat, brown long-eared bat, common pipistrelle and soprano pipistrelle.	Noise disturbance.	Negligible adverse (not significant).	No residual impact

2.2.2 Given this, there is no clear pathway for an unidentified significant effect to occur or to have been under-valued in the ES assessments. The pathway for the fragmentation impact within the main development site which does in part relate to the noise and light in the construction area (but also the loss of habitat) is in essence an in-combination impact and is likely to reduce commuting routes for bats to three dark corridor and around the site boundaries, as is stated in the impact assessment. The impact assessment is summarised below (**Table 2-2**).

Table 2-2: Summary of impact Assessment of fragmentation on the MDS

Scheme	Construction Years 0 -12	Operation Years 12+
Main Development Site (ES Bat Addendum) [AS-208]	Moderate adverse (significant)	No residual impact

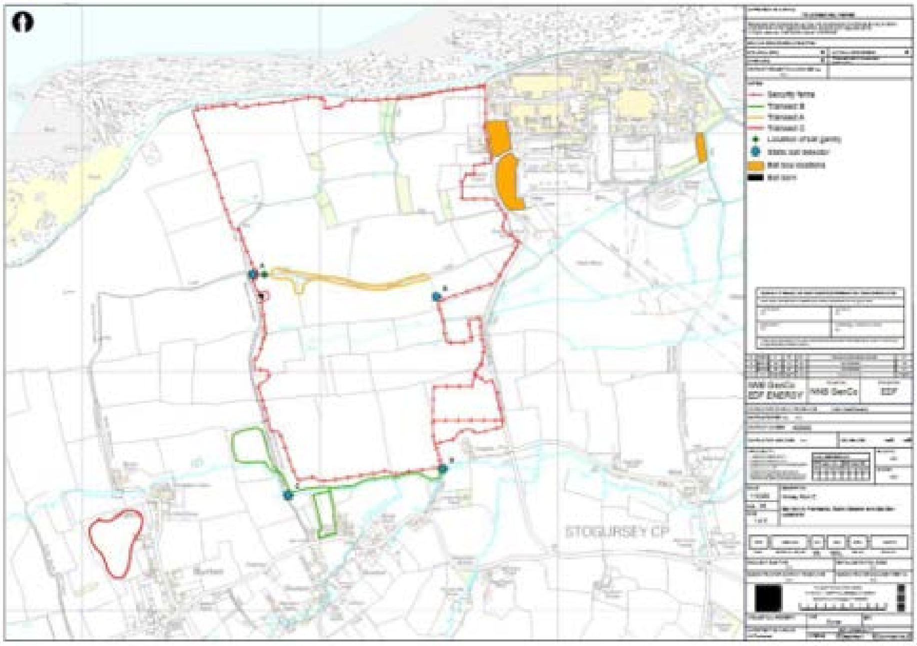
2.3 Point 2

2.3.1 For the main development site, para 7.6.64 [APP-394] as is outlined in the Updated bat impact assessment included at **Appendix 2.9.B** of the **ES Addendum** [AS-208], a comparable site, Hinkley Point C, was assessed, and the success of the approaches on that site to address noise and lighting impacts were reviewed. It is noted that Hinkley is not exactly the same as SZC, with some differences in bat assemblages etc. but it is a similar scale of development, with similar impacts and many similarities. It is very rare that a comparable scheme, with accurate baseline and impact monitoring is available to compare impacts, and as such it would be inappropriate not to utilise this valuable information.

2.3.2 The monitoring data from Hinkley Point C provides additional evidence that in-combination impacts could be kept to a level that will not result in a significant in combination effect, and that the bat population are likely to adapt to the noise and lighting impacts. This is presented in paragraphs 8.3.45, 8.3.56 and 8.3.57 of the **ES Addendum** [AS-208] and presented below:

8.3.45 The static detector results suggest that there is decreased barbastelle activity at detector locations A and B, but increased activity at detector locations C and D. This supports an assessment that the bats would change behaviour in adaptation to the impacts.

Plate 8.10: Location of static detector monitoring locations (from Ref. 42)



8.3.56 It is assumed on a precautionary basis that commuting and foraging barbastelles may sometimes avoid the Upper Abbey Farm bridleway (Bridleway 19) and Stonewell Belt, or have reduced foraging efficiency within these areas, if any night works producing significant noise are underway in Phases 1 and 2 of construction. This is what is suggested by the comparable development at Hinkley Pont C (Ref. 42), where barbastelles continue to use a retained commuting route through the construction area, albeit at a lower level than before the development.

8.3.57 Barbastelles commuting and foraging along Black Walks and the northern edge of Kenton Hills and within Ash Wood may be affected by construction noise at 65dB (at 22+ kHz), but the likely effect of this would be to displace bats further into these woodland areas, rather than to cause fragmentation. Potential alternative commuting routes via the SSSI crossing and eastern edge of Goose Hill would likely only be affected during Phase 1. Therefore, effects in these areas are not considered significant.

2.3.3 It is acknowledged that the sites are not exactly the same (having differences in the bat assemblages), but are highly comparable in impact and offer a valuable insight into the potential impact on bats from a power station development. The Hinkley development shows that when controlled, bats will continue to use the retained corridors despite noise and light.

2.4 Point 3

2.4.1 For the main development site, new habitats which are not impacted by noise or light have been created, including approximately 154ha of habitat creation on the wider EDF Energy estate as advanced mitigation or compensation for the anticipated effects of the Sizewell C Project, comprising:

- Aldhurst Farm – west of the site consisting of 49ha of acid grassland and scrub, 5ha of reedbeds and 2km of ditches (static detector surveys in 2020 detected barbastelle passes in relation to this site);
- Marsh harrier habitat improvement area – north of the site consisting of 48ha of grassland including hedgerows and rough grassland, reedbed and 0.7ha of wet woodland; and
- The Studio Field complex, which provides a reptile receptor area – south of the site consisting of 58ha of acid grassland.

2.4.2 This will minimise the potential impact upon species populations across the wider EDF Energy estate, and provide additional foraging areas should unforeseen impacts from noise and light make additional areas of forging unsuitable for foraging bat species.

2.5 Point 4

2.5.1 For several sites, a suite of monitoring is proposed within the Terrestrial Ecology Monitoring and Mitigation Plan (**TEMMP)** [REP5-088] (see **Table 4.4**, reproduced overleaf of the main development site), secured by Requirement 4, which will allow any individual impacts or any unforeseen individual or in-combination impacts to be identified and addressed by remedial measures.

2.5.2 The assessment relies on the robust available data, and the overall impacts and mitigation strategy were developed with the significant level of survey information gained to date, which that provides confidence in the effectiveness of the mitigation proposed based on current best practice and research. However, there is limited research available for some impacts on some bat species, particularly in combination effects and bats, as living things, do not always behave as expected.

Table 2-3: Bat Monitoring (Construction and Operation)

Year	Monitoring Survey	Timing	Description	Target & Effectiveness measures	Potential interventions	Securing mechanism
Roosts in Trees & Buildings (in areas sensitive to disturbance)						
Construction Y1 to Y12 (inclusive)	Known roosts and wider roost resources will be monitored to ensure that any unforeseen impacts can be captured. Areas which have been assessed as being sensitive to disturbance from noise / light will be monitored throughout the various phases of the Sizewell C Project, with monitoring surveys being carried out annually. The monitoring survey works will assess the noise levels produced by the works at known roost site locations and the ongoing usage of roosts compared to baseline surveys Lighting assessments will be conducted during the bat surveys (particularly activity surveys). Hand-held light detectors will monitor the light levels	Annually in the correct season for each roost type. I.e. Check for maternity roosts in peak maternity season, check of status of other roosts throughout the active season. Annual check of hibernation roosts in winter.	Usage of roosts and roost resources (to account for roost switching) will be compared to the baseline status, where significant changes to the baseline status are identified interventions will be conducted. Monitoring locations will include: - Roosts in trees along the northern edge of Kenton Hills and Nursery Covert - Roosts in the buildings at Upper Abbey Farm - Roosts in trees within Ash Wood - Roosts in trees within Fiscal Policy - Noise monitoring will be undertaken during the construction phase, including an assessment of high frequency noise at appropriate heights of relevance to bats. This will be compared to foreseen levels and should any discrepancies be encountered then remediation actions would be undertaken as appropriate.	Success criteria will be: - Roosts continue to be utilized with no significant changes in use (number of bats or roost type) - High frequency noise levels at or below those predicted within the noise modelling. - Light levels controlled within ‘Dark’ limits.	If roosts are found to be being utilized in a substantially different way, the following interventions are proposed: • mitigation focused on the bat population, which could include further roost provision. If necessary, this is the appropriate juncture at which the requirement for an EPS derogation license may be triggered • Potential interventions, should it be assessed that it is the commuting routes to the roosts for bats which are impacted is presented below. If high frequency noise is found to be having a material effect on roost usage, the following approaches will be implemented: • Implementation of noise abatement measures, which could include working methodologies, additional noise attenuation fencing or bunds. If lighting levels are found to be having a material effect on roost usage lighting will be modified to	Requirement 4

Year	Monitoring Survey	Timing	Description	Target & Effectiveness measures	Potential interventions	Securing mechanism
	in key locations and allow for proactive response where required.		Light monitoring, including the usage of handheld lux detectors would be undertaken during bat surveys. Readings above prescribed 'dark' levels at roosts will be addressed (in dark areas a level of 0.1 lux is proposed). Monitoring approach for roosts will depend upon status, species, location etc. Roosts within structures will be assessed through internal inspections and/or emergence surveys. Roosts within trees will be assessed through tree climbing inspections. Where roosts are only used sporadically, static detectors may be employed.		reduce this through relocation, baffles or screening as appropriate.	
Construction Y1 to Y12 (inclusive) [Radio Tracking specification]	Comparison of species assemblage (1) and breeding status (2) through bat trapping surveys. Radio tracking of maternity populations of barbastelle and Natterer's bats to determine activity patterns, roost location and home ranges in response to construction	May – September pre construction, year 1, 3, 5, 8 and 12 post construction commencement	Trapping locations to be established in key areas within the Sizewell estate and off site (where appropriate/agreed) where known populations of these species occur. Sample of bats to be selected (approx. 10-20% of estimated population) for radio tracking over two sessions each monitoring year in June and August.	Presence of the same bats species and breeding status in trapping areas Home ranges areas and spans not significantly different to pre-construction areas. Roost locations within compensation/retained areas.	As above	As above

Year	Monitoring Survey	Timing	Description	Target & Effectiveness measures	Potential interventions	Securing mechanism
Operation Y13 – Y23	Monitoring of roosts will continue every two years to monitor the ongoing usage of roosts as relevant Operational noise monitoring is not proposed The methods applied during the construction in Y1-Y12 would be designed to be future proofed for use in Y13-23 to ensure comparable data is collected over the duration of the construction and operational monitoring phases.	Every two years in the correct season for each roost type. I.e. Check for maternity roosts in peak maternity season, check of status of other roosts throughout the active season. Annual check of hibernation roosts in winter.	Monitoring approach for roosts will depend upon status, species, location etc. Roosts within structures will be assessed through internal inspections and/or emergence surveys. Roosts within trees will be assessed through tree climbing inspections. Where roosts are only used sporadically, static detectors may be employed.	Success will be determined by the retention of known roosts over the operational phase.	In the event of mitigation not being successful, additional mitigation measures would be explored and implemented as appropriate. Additional mitigation measures which could be implemented during the operational phase include additional landscape planting to form broader bat corridors or buffers to existing woodlands for bats. The **oLEMP** provides scope to amend the balance between woodland / scrub planting and acid grassland provision to provide greater connectivity or woodland extensions for bats if this is deemed appropriate.	Requirement 4
Bat Boxes and Bat Barn						
Y1 to Y12 (inclusive)	Bat boxes and the bat barn will be monitored on an annual basis during the construction phase. The surveys will be to confirm presence/ absence and the species assemblage present.	Annually in September	All monitoring will be conducted by an appropriately licensed bat ecologist. Monitoring will consist of a check of the feature for evidence of use, such as droppings, smoothing, feeding remains, smell, staining and bat fly (*Nycteribiid*) pupae. Locations will include: - Sites where roosts are known to be present,	Success criteria will include the uptake of occupation by bats and whether the number of bats present increases or remains consistent throughout the construction phase.	In the event of a bat box not being occupied within three years of installation, consideration will be given to moving the box to an alternative site nearby, to be determined by a licensed bat ecologist and in agreement with the Ecology Working Group. The box will be moved to an alternative suitable location if it is considered likely that conditions in the location have changed and this has impacted the suitability for bats. If the locations are still considered suitable, in agreement with the	PSL (TBC) Requirement 4

Year	Monitoring Survey	Timing	Description	Target & Effectiveness measures	Potential interventions	Securing mechanism
			e.g., Natterers roost identified in 2020 (>40 bats in each box) - Monitoring of bat boxes erected for barbastelle already (45 boxes distributed already around the site). Any newly installed bat boxes to mitigation any further identified roost loss in trees. Temperature and humidity data loggers will be placed inside the bat barn to measure the environmental conditions match those within the structures where roosts have previously been identified.		Ecology Working Group, the boxes may be left in situ. It may be that the roosting opportunities have not been found by the bats or that in that particular location roost sites are not a limiting requirement. In the event of the bat barn not being occupied within three years of installation, consideration will be given to modifications which might be acceptable within the context of the DCO, with the modifications to be determined by a licensed bat ecologist and in agreement with Natural England.	
Y13 – Y18 (i.e. first 5 years of Operation)	Bat boxes and the bat barn will continue to be monitored for five-years beyond the completion of construction. The surveys will be to confirm presence/ absence and the species assemblage present.	Annually in September (optimal time)	Monitoring will consist of a check of the feature for evidence of use, such as droppings, smoothing, feeding remains, smell, staining and bat fly (*Nycteribiid*) pupae.	Success criteria will be the occupation by bats and whether the number of bats present increases or remains consistent during the operational phase.	Any remedial measures will be addressed during the construction period (Y1-Y12)	PSL (TBC) Requirement 4
Commuting Routes and Home Ranges						
Y1 to Y12 (inclusive)	Key commuting routes will be monitoring across the site using a	Annually in May, June, July,	Locations to be monitored for key commuting routes includes:	Success of existing mitigation measures will be determined through the	Should it be found that certain routes are not being used or overall there is substantial reduction in the	Requirement 4

Year	Monitoring Survey	Timing	Description	Target & Effectiveness measures	Potential interventions	Securing mechanism
	combination of static detectors and for landscape scale context, radio tracking. One static detector position is proposed per commuting route and a control site (matched with pre construction locations), The monitoring will assess the ongoing usage of bats of existing commuting routes/ key landscape features compared to the base line surveys and simultaneous control locations. Areas which have been assessed as being sensitive to disturbance from noise / light will be monitored throughout the various phases of the Sizewell C Project, with monitoring surveys being carried out annually. The monitoring survey works will assess the high frequency noise levels produced by the works at known commuting routes.	August and September.	- Bridleway 19 east of Upper Abbey Farm - Fiscal Policy - Black Walks - Northern edge of Kenton Hills - Eastern boundary of Goose Hill - The Grove - The SSSI Crossing - The 'new' commuting route between Kenton Hills and Ash Wood. Species using the routes will be assessed, as will the overall level of activity (overall and for each species, particularly barbastelle and Natterers bat). This will be compared with pre-construction levels. The change will be assessed holistically (it is foreseen that some routes will likely increase in usage overall and others will reduce). Noise monitoring will be undertaken during the construction phase, including an assessment of high frequency noise. This will be compared to foreseen levels and should any discrepancies be encountered then remediation actions would be undertaken as appropriate.	ongoing use of commuting routes over the course of the construction phase, at similar levels to those recorded during baseline monitoring (assessed holistically).	permeability of the site to bats, a number of interventions are possible. - Additional planting can be utilized to enhance the connectivity of routes; - Movable potted vegetation can be used to reduce the gaps in the vegetation during construction. If high frequency noise is found to be having a material effect on commuting routes, noise abatement measures will be deployed, which could include working methodologies, additional noise attenuation fencing or bunds. If lighting levels are found to be having a material effect on commuting routes, lighting will be modified to reduce this through relocation, baffles or screening as appropriate.	

Year	Monitoring Survey	Timing	Description	Target & Effectiveness measures	Potential interventions	Securing mechanism
	Lighting assessments will be conducted during the bat surveys. Hand-held light detectors will monitor the light levels in key locations and allow for proactive response where required.		Light monitoring, including the usage of handheld lux detectors would be undertaken during bat surveys. Readings above prescribed 'dark' levels at roosts will be addressed (in dark corridors a level of 1 lux is proposed).			
Y13 – Y18 (i.e. first 5 years of Operation)	Monitoring of commuting routes will continue on an annual basis to monitor the ongoing usage of these routes, using static detectors. The survey methods applied during the construction in Y1-Y12 would be designed to be future proofed for use in Y13-18 to ensure comparable data is collected over the duration of the construction and operational phases.	Annually in May, June, July, August and September.	The above locations would be monitored using the same approach as during construction (static detectors). One static detector position is proposed per commuting route (matched with pre construction locations), with activity transects to cover all routes identified monthly).	Success of mitigation measures will be determined through the ongoing use of commuting routes, at similar levels to those recorded during baseline monitoring (assessed holistically).	Success of existing mitigation measures into the operational phase will be determined through the use of commuting routes over the course of the construction phase being maintained into the operational phase and at similar (or greater) levels to those recorded during baseline monitoring. Additional mitigation measures which could be implemented during the operational phase include additional landscape planting to form broader bat corridors for bats. The **oLEMP** provides scope to amend the balance between woodland / scrub planting and acid grassland provision to provide greater connectivity for bats if this is deemed appropriate.	Requirement 4 oLEMP secured under Requirement 14
Bat Activity Across the Site (foraging)						

Year	Monitoring Survey	Timing	Description	Target & Effectiveness measures	Potential interventions	Securing mechanism
Y1 to Y12 (inclusive)	As with the bat commuting routes, general bat activity, particularly foraging will be monitored across the main development site including the proposed mitigation areas. Monitoring surveys will continue across the main development as undertaken for the baseline surveys, using a combination of static monitoring and radio tracking throughout the various phases of the proposed development. Static positions will match those conducted to inform the baseline in the year prior to construction commencing. Areas which have been assessed as being sensitive to disturbance from noise / light will be monitored throughout the various phases of the Sizewell C Project, with monitoring surveys being carried out annually.	Annually in May, June, July, August and September.	Static detector locations and to be surveyed will be as per the pre-construction locations as shown in Figure 1 of the **2020 Bat Static Monitoring Survey Report** (Doc Ref. 6.13 (A) [AS-037]), to include static positions: • MS01 • MS9 • MS14 • MS10 • MS7 • MS15 • MS12 • MS22 • MS18 • MS19 • MS20 • MS25 • MS26 • MS28 • MS31 • MS27 • MS29 • MS30 • MS33 • MS34 • MS35 • MS36 • Aldhurst Farm • Lover's Lane Entrance • The Grove • South of Great Mount Wood	Success of existing mitigation measures will be determined through the ongoing use of foraging areas over the course of the relevant phase, at similar levels to those recorded during baseline monitoring, albeit with some displacement or increased use expected towards areas of new habitat creation, such as Aldhurst Farm.	Should it be found that certain areas are not being used by bats or overall there is significant reduction in the permeability of the site to bats, a number of interventions are possible. - Additional planting can be utilized to enhance the connectivity of routes; - Movable potted vegetation can be used to reduce the gaps in the vegetation during construction. If high frequency noise is found to be having a material effect on foraging activity, noise abatement measures will be deployed, which could include working methodologies, additional noise attenuation fencing or bunds. If lighting levels are found to be having a material effect on foraging activity, lighting will be modified to reduce this through relocation, baffles or screening as appropriate.	Requirement 4

Year	Monitoring Survey	Timing	Description	Target & Effectiveness measures	Potential interventions	Securing mechanism
	The monitoring survey works will assess the high frequency noise levels produced by the works at known commuting routes. Lighting assessments will be conducted during the bat surveys. Hand-held light detectors will monitor the light levels in key locations and allow for proactive response where required.		Locations will be varied and updated as relevant in discussion with the Environment Review Group			
Y13 – Y18 (i.e. first 5 years of Operation)	As with the bat commuting routes, general bat activity will be monitored across the main development site during the operational phase which will include the proposed mitigation areas. Monitoring will be through the use of static bat detectors. Monitoring surveys will continue across the main development site as undertaken for the baseline surveys, using a combination of static monitoring and radio	Annually in May, June, July, August and September.	General bat activity will be monitored across the main development site during the operational phase which will include the proposed mitigation areas.	In the operational phase, use of habitats across the temporary construction area once these are established in accordance with the **oLEMP** [REP1-010] will be an indication of success. Overall activity levels should be comparable to pre-commencement levels.	Additional mitigation measures which could be implemented during the operational phase include additional landscape planting to form broader bat corridors for bats. The **oLEMP** [REP1-010] provides scope to amend the balance between woodland / scrub planting and acid grassland provision to provide greater connectivity for bats if this is deemed appropriate.	**oLEMP** [REP1-010] secured under Requirement 14

Year	Monitoring Survey	Timing	Description	Target & Effectiveness measures	Potential interventions	Securing mechanism
	tracking throughout the various phases of the proposed development.					

2.6 Point 5

2.6.1 The potential of high levels of light and noise occurring at the same time was considered. The statement in paragraph 14.13.470 [AS-033] refers to the nature of noise and lighting in relation to construction activity. High levels of noise are primarily anticipated during the daytime, when the majority of on-site activity will occur. Lighting, as outlined in the Lighting Management Plan [APP-182] will be controlled through a number of measures, stated below (relevant sections of paragraphs 8.2.79 – 8.2.89 in **Appendix 2.9.B** of the **ES Addendum** [AS-208]):

- All lighting installed shall have some form of control to suit the tasks being undertaken and ensure energy is not wasted with lights being in operation 24hrs a day.
- In general task lighting will only be used during specific times at specific locations and will typically be provided by portable units which will have manual switching. If the units are to be in place for a prolonged period it would be beneficial for the unit to have a photo electric control cell which will automatically turn the lighting on at dusk and off again at dawn when natural lighting levels have increased or reached pre-determined levels.
- Ambient lighting – Ambient lighting will be more permanent and will be required to operate dusk to dawn, so the most suitable method of control will be via a photo electric control cell possibly with pre-programmed dimming or via a central management system (CMS).
- Access control points – At access control points there will be the need to boost the ambient lighting when there is the need to undertake an inspection etc. This would best be controlled via a local switch either at the check point or in a control centre. It is important to consider the light source when instant boost lighting is required as most light sources other than LED will need some form of run up time to reach full output.”
- Where lighting in proximity to a bat roost or commuting route/flightpath is unavoidable then, in addition to the points made [in the Mitigation Measures section], the following additional mitigation measures shall be adopted for both fixed and temporary lighting:
  - use a light source that has a narrow spectrum with no UV content;
  - use a warm colour temperature (2700K and below);

  - use a tuneable LED luminaire;

- Where the interconnected network crosses a lit area these areas shall be kept dark by introducing a gap in the lighting design where safe to do so. For example, if they are dissected by a road, a gap of approximately 30m will be left beyond the design spacing of any lighting. Where lighting is proposed parallel to commuting routes / flightpath a 10m buffer zone will be left. Plate 8.5 shows the 30m dark buffer zones."; and

- As such, with the lighting and noise control measures in place, the in-combination effect can be minimised by employing all measures to reduce noise and lighting, therefore further reducing the likelihood of noise and lighting impacts occurring simultaneously.

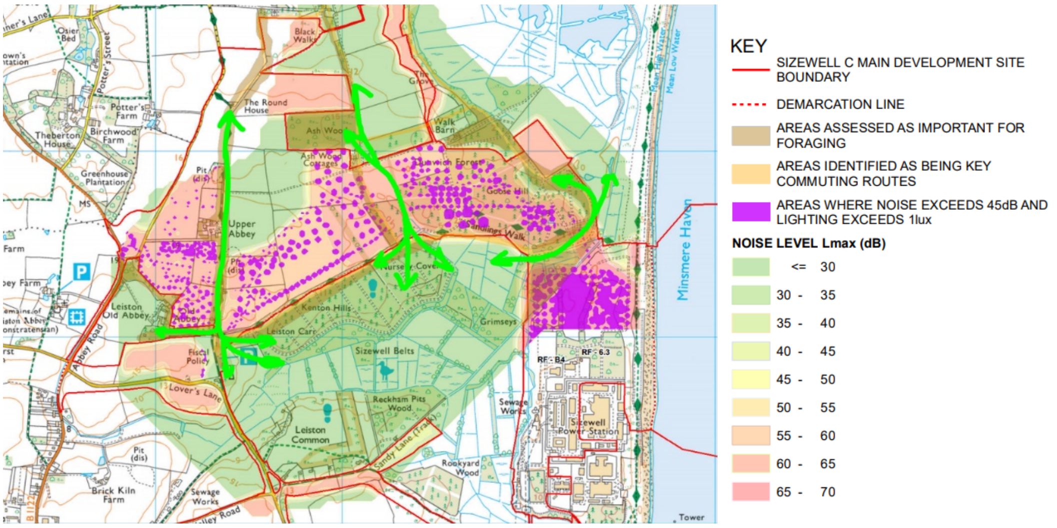
2.6.2 With regards to noise, the modelling of the potential noise levels which may impact foraging and commuting bats is highly precautionary. The 22khz+ contours used to inform the assessment show a maximum peak noise, at each location. This is modelled in the daytime, at levels which are 'peak' levels, so represent the highest likely noise levels from the worst-case activities occurring at the worst locations at the same time, during that phase of works. Since the works are unlikely to occur in all of the worst-case locations at the same time, or for that matter, at all possible locations at the same time, it is unlikely in the extreme that the levels shown in the contours would actually arise across the site at any one time, as shown .

2.6.3 It should also be noted that the noise modelling did not account for the newly established central dark corridor which will link Kenton Hills to Ash Cottages. Within this area, once constructed early in the site establishment phase, there will two water management zones bordered by tree lines. Once these are in place, there will not be no substantive works within this area to generate high noise levels, ensuring that this is retained as a quiet and dark corridor.

2.7 Point 6

2.7.1 The outputs from the noise and lighting models have been overlaid to determine the potential for in-combination effects of noise and light. This demonstrates that the potential for in-combination effects are extremely limited. This is presented in the plates below by overlaying noise (of over a 45 dB threshold – a very precautionary level) and lighting (of over the 1 lux). In these models, the largest area identified as having potential for an in combination impact is identified as Phase 1, with light modelled at 0m (and dB at 8 or 22khz+ modelled). Even in this combined model, there are clear areas with no overlap of noise and light at the three key commuting areas retained for bats through the MDS as presented in Plate 1 below (except from Figure 5A).

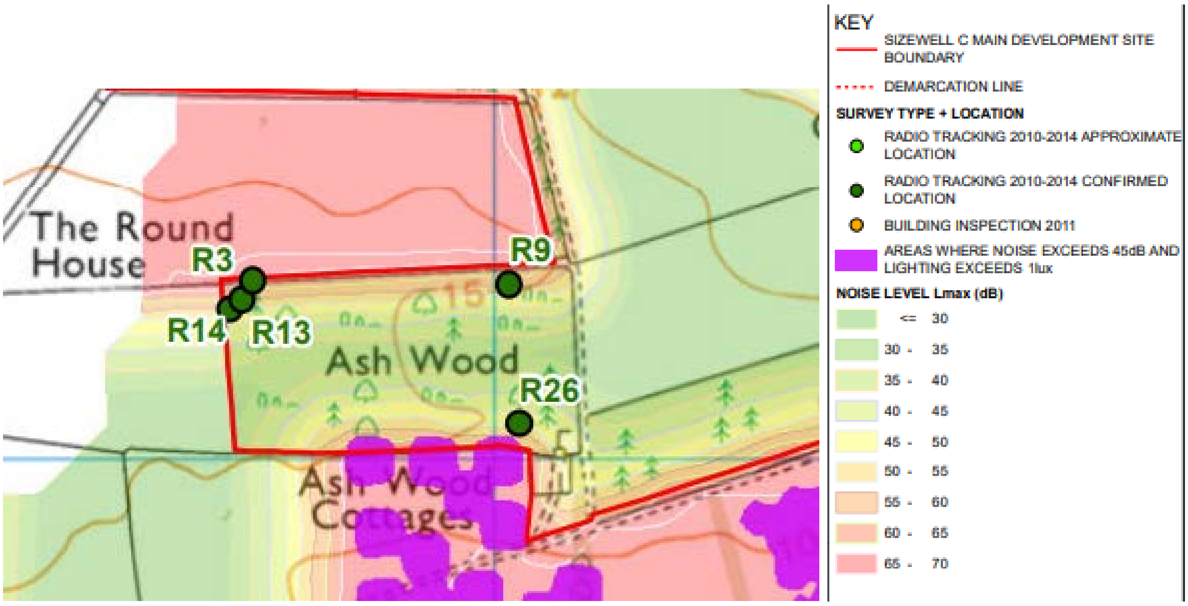
Plate 1: Excerpt from Figure 14A - Sketch showing retained commuting routes with no in-combination effect of noise and light, (lighting at 0m) during phase 1 of the development



N.B. Purple areas are where lighting is >1 lux and noise is >45dB (22khz +)

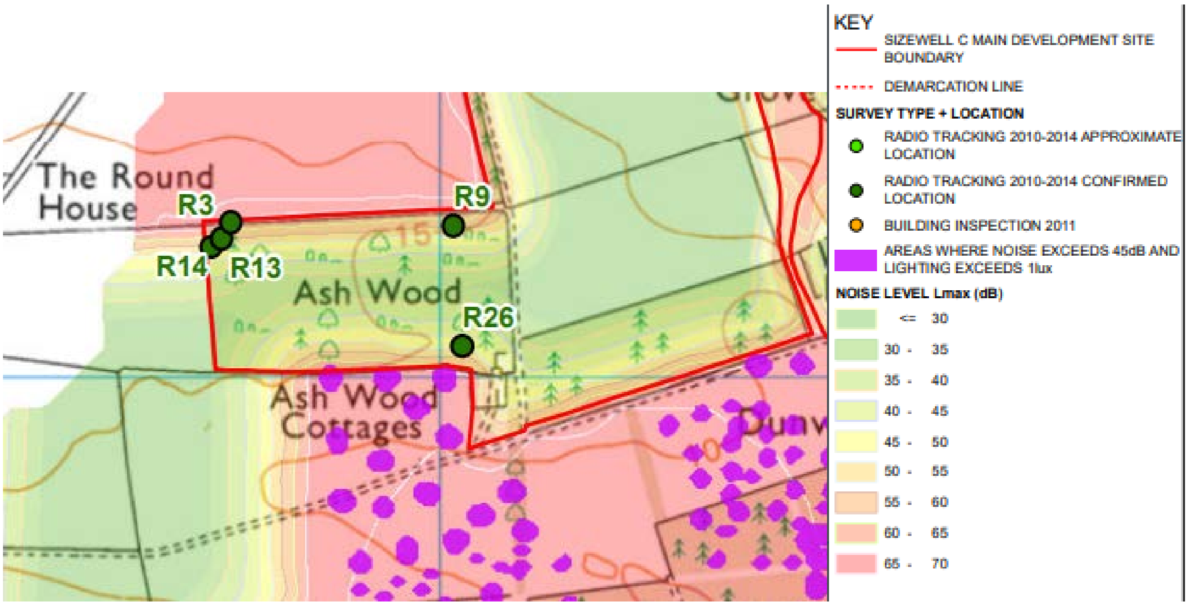
2.7.2 It is noted that at Ash Wood, there are a few locations where it appears that there is potential for an in-combination impact, as presented as Plate 2 below (excerpt from Figure 5A). However, the lighting modelling does not take into account the 5m hoarded fencing proposed in this location. This includes a 5m high fence along the south of Ash Wood, which will screen light at 0 -5m. As presented in below in Plate 3 (excerpt from Figure 5B, there is no impact at 5m, therefore the light fencing will remove this impact pathway. The location of the boundary treatments is presented on Plate 4.

Plate 2: Locations which modelling shows have potential for in-combination impacts, (lighting at 0m) during phase 1 of the development



N.B. Purple areas are where lighting is >1 lux and noise is >45dB (8khz +)

Plate 2: Excerpt from Figure 5A Modelling of in-combination impacts around Ash Wood (lighting at 5m) during phase 1 of the development



N.B. Purple areas are where lighting is >1 lux and noise is >45dB (8khz +)

Plate 3: Excerpt from Figure 17 showing the location of boundary treatments around Ash Wood

KEY

- SIZEWELL C MAIN DEVELOPMENT SITE BOUNDARY
- DEMARCATION LINE
- EARTH BUND
- GRASSED BUND
- NOISE MITIGATION FENCE
- LIGHT CONTROL AREA / DARK CORRIDORS

3 SUMMARY

3.1.1 In summary, inter-relationship effects on bats relating to noise, lighting and habitat loss are considered to 'not significant' due to the primary and tertiary mitigation measures that are embedded into the scheme design. With the implementation of primary/tertiary mitigation and secondary mitigation (monitoring), residual effects (individually, minor adverse or negligible) are not considered to be significant and the inter-relationship of these residual effects, in this instance at the southern park and ride, is not considered to be significant.

3.1.2 For barbastelle on the main development site, a moderate adverse (significant) effect is predicted during construction arising from habitat fragmentation. This is due to the proposed removal of an area (Goose Hill plantation woodland) known to be utilised by barbastelle between areas to the north-east and south-west of the construction area.

3.1.3 There are retained and new commuting areas through the site meaning that bats will be able to traverse the site, however, one part of the site known to be used by barbastelle will be fragmented. This is not presented as an in-combination effect, as it the removal of the habitat in this area that is the primary cause of the fragmentation, but the noise and lighting in this area contributes to the assessment that this area will become unsuitable for bats, and is therefore captured in the ES.

3.1.4 As outlined in the updated bat assessment, **Appendix 2.9.B** of the **ES Addendum** [AS-208], in paragraph 8.2.120, the in-combination effect of the lighting and noise upon bats utilising the retained and created commuting routes is considered not significant.

Figures

[Please refer to **Appendix 2.9.B** of the **ES Addendum** [AS-208] for these figures]

Figure Naming relates to the Figures in Appendix 2.9.B of the ES Addendum [AS-208] for clarity.

5A – Noise and lighting (in-combination) effects on Barbastelle Roosts during Phase 1 (Lighting at 0m height)

5B - Noise and lighting (in-combination) effects on Barbastelle Roosts during Phase 1 (Lighting at 5m height)

6A - Noise and lighting (in-combination) effects on Natterers' Roosts during Phase 1 (Lighting at 0m height)

6B - Noise and lighting (in-combination) effects on Natterers' Roosts during Phase 1 (Lighting at 5m height)

7A - Noise and lighting (in-combination) effects on Brown Long-eared and Other Bat Species Bat Roosts during Phase 1 (Lighting at 0m height)

7B - Noise and lighting (in-combination) effects on Brown Long-eared and Other Bat Species Bat Roosts during Phase 1 (Lighting at 5m height)

8A - Noise and lighting (in-combination) effects on Barbastelle Roosts during Phase 2 (Lighting at 0m height)

8B - Noise and lighting (in-combination) effects on Barbastelle Roosts during Phase 2 (Lighting at 5m height)

9A - Noise and lighting (in-combination) effects on Natterers' Roosts during Phase 2 (Lighting at 0m height)

9B - Noise and lighting (in-combination) effects on Natterers' Roosts during Phase 2 (Lighting at 5m height)

10A - Noise and lighting (in-combination) effects on Brown Long-eared and Other Bat Species Bat Roosts during Phase 2 (Lighting at 0m height)

10B - Noise and lighting (in-combination) effects on Brown Long-eared and Other Bat Species Bat Roosts during Phase 2 (Lighting at 5m height)

11A - Noise and lighting (in-combination) effects on Barbastelle Roosts during Phase 3/4 (Lighting at 0m height)

11B - Noise and lighting (in-combination) effects on Barbastelle Roosts during Phase 3/4 (Lighting at 5m height)

12A - Noise and lighting (in-combination) effects on Natterers' Roosts during Phase 3/4 (Lighting at 0m height)

12B - Noise and lighting (in-combination) effects on Natterers' Roosts during Phase 3/4 (Lighting at 5m height)

13A - Noise and lighting (in-combination) effects on Brown Long-eared and Other Bat Species Bat Roosts during Phase 3/4 (Lighting at 0m height)

13B - Noise and lighting (in-combination) effects on Brown Long-eared and Other Bat Species Bat Roosts during Phase 3/4 (Lighting at 5m height)

14A - Noise and lighting (in-combination) effects on key bat commuting and foraging areas during construction Phase 1

15A - Noise and lighting (in-combination) effects on key bat commuting and foraging areas during construction Phase 2

16A - Noise and lighting (in-combination) effects on key bat commuting and foraging areas during construction Phase ¾

17 – Boundary Treatments

APPENDIX C: SIZEWELL LINK ROAD WATERCOURSE CROSSINGS MITIGATION NOTE

CONTENTS

TABLES

PLATES

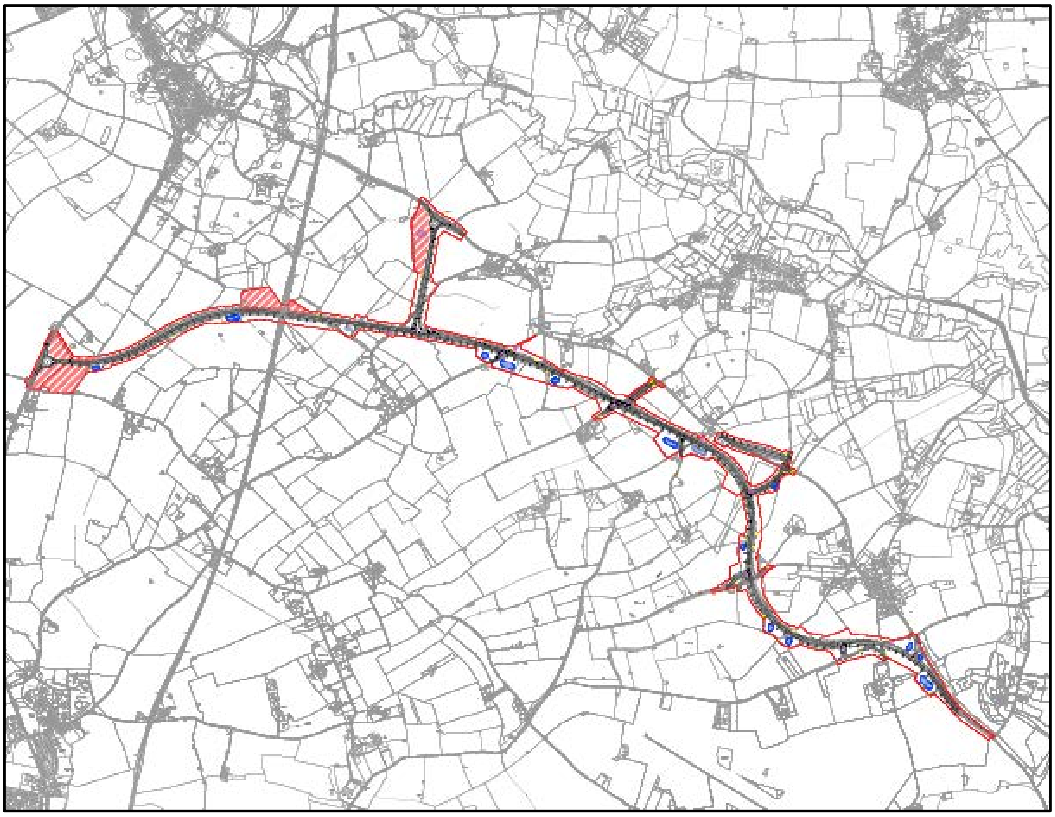
1 INTRODUCTION

1.1.1 NNB Generation Company (SZC) Limited (SZC Co.) submitted an application for a Development Consent Order (DCO) to the Planning Inspectorate under the Planning Act 2008 for the Sizewell C Project (referred to as the 'Application') in May 2020. The Application was accepted for examination in June 2020.

1.1.2 SZC Co. has undertaken work to validate and develop the design of the Sizewell link road that was originally submitted as part of the DCO application. This document forms one of a series of design validation and evolution documents being provided to the Examining Authority in support of the **Outline Drainage Strategy** [REP2-033].

1.1.3 The Sizewell link road is one of the Sizewell C Project's associated development sites; a permanent single carriageway road that would run 6.8km from the A12 just south of Yoxford in an easterly direction, joining the B1122 south of the town of Theberton. A large scale plan showing the route of Sizewell link road is shown in **Plate 1**.

Plate 1: Sizewell Link Road Location and Route



1.1.4 The Sizewell link road would create a new route around the south of the villages of Yoxford, Middleton Moor and Theberton, helping to reduce the amount of traffic on the B1122 during the peak construction phase of the Sizewell C Project.

1.1.5 The Sizewell link road will be designed to Suffolk County Council's (SCC) adoptable standards as follows:

- Design Manual for Roads and Bridges (DMRB)/ Manual of Contract Documents for Highway Works (MCHW);
- CIRIA C753 The SuDS Manual;
- Sustainable Drainage Systems (SuDS) a Local Design Guide Appendix A to the Suffolk Flood Risk Management Strategy, Suffolk County Council, May 2018; and
- Suffolk SuDS Palette (SSP) – Guidance Suffolk County Council.

1.1.6 The Sizewell link road would cross six watercourses that were identified as part of the **Sizewell Link Road Flood Risk Assessment** (FRA) [APP-136].The location of the watercourses and crossings is shown in **Plate 2 and summarised in Table 1**. The watercourses are identified by the arrows and the crossings are marked green and labelled 'WC1', 'WC2' etc.

Plate 2: Sizewell Link Road Watercourse Crossings

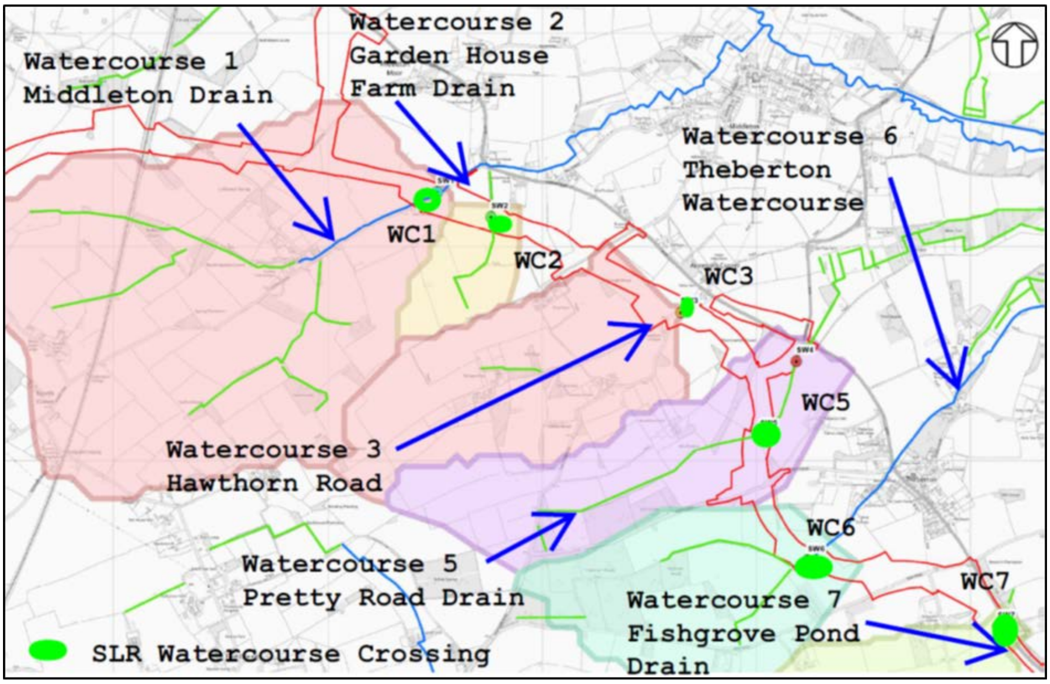


Table 1: FRA referenced DCO Concept Drainage Watercourse Crossings (Note: Crossing No's & Watercourse No's are consistent with those used in the SLR FRA Addendum [APP-136])

Crossing Number	Watercourse Number	Watercourse Name	Legal Status/Regulator
1	1	Middleton Drain	Main River EA
2	2	Garden House Farm Drain	Ordinary Watercourse SCC
3	3	Hawthorn Road Drain	Ordinary Watercourse SCC
4	5	Pretty Road Drain Leiston Road Crossing	Ordinary Watercourse SCC
5	5	Pretty Road Drain	Ordinary Watercourse SCC
6	6	Theberton Watercourse	Main River EA
7	7	Fishpond Grove Drain	Ordinary Watercourse SCC

1.1.7 Separate columns are provided for crossing no.'s and watercourse no's because Watercourse No 5 is crossed twice (crossing no's 4 & 5).

1.1.8 The Flood Risk Assessment identified crossing 4 located on Pretty Road Drain, which is included in the table for completion. This is an existing culvert crossing of the B1122 near to its junction with the B1125. At the time of undertaking the assessment, it was unclear as to whether the culvert would require replacement or modification. However, following completion of the Preliminary Drainage design, it is confirmed that this culvert won't be affected by development as explained in **Sizewell Link Road FRA Addendum** [REP2-026]. As a result, this crossing is not considered further within this note. This is also the reason it is not shown on Plate 2 above.

1.1.9 In addition to the six watercourses that would be affected, three local field ditch crossings have been identified following a site visit in January 2021.

1.1.10 The presence of local watercourses situated on either side of Pretty Road has also been identified following a site visit in February 2021. Since Sizewell link road crosses Pretty Lane in a cutting, the current outfalls for these watercourses would be removed, so these drains would be affected. They are therefore considered in this note alongside the three field ditches.

2 PURPOSE

2.1.1 The **Outline Drainage Strategy** [REP2-033] identified at concept level the proposed drainage approach required for:

- The effective removal of runoff from the proposed Sizewell link road highway and its disposal;
- The crossing of watercourses along the line of the Sizewell link road.

2.1.2 This strategy was developed in consultation with drainage regulators and local authorities, including SCC and the Environment Agency (EA). A number of workshops were held and the observations/requirements of drainage regulators were incorporated in the strategy.

2.1.3 It was agreed that Sizewell Link Road watercourse crossings 1, 2, 3, 5 and 6 would be constructed as portal culverts in which the culvert would straddle the channel and bank leaving them in natural state to avoid impacts on bed geomorphology and also mitigate effects on the upstream and downstream movement of mammals, especially otter, which was recognised in the **Environment Statement** (APP-461) as being likely to use these ditches as migration corridors within the landscape. However, the culvert crossings would result in a loss of watercourse habitat that will require mitigation.

2.1.4 At watercourse crossing 7 to the east of Theberton, the watercourse crosses beneath the B1122 in a 450 mm diameter pipe. This pipe would need to be extended upstream to a point clear of the proposed link road.

2.1.5 The design of infrastructure for the removal of highway runoff has also been developed in consultation with drainage regulators and local authorities, including SCC and the EA. In accordance with the required design standards and SCC requirements, the drainage will incorporate Sustainable Drainage Systems (SuDS) treatment to mitigate any increased pollution risk to the receiving watercourses. The provision of such SuDS infrastructure has the potential to offset watercourse habitat loss and deliver significant enhancement subject to their design also maximising biodiversity.

2.1.6 The purpose of this report is to:

- quantify the balance between watercourse loss due to culverting and gain due to provision of new watercourses;
- confirm the potential watercourse works that can be undertaken to enhance watercourse appearance, biodiversity and habitat;

- confirm the range of SuDS measures to be considered for incorporation in the highway drainage infrastructure to be offered for adoption by SCC.

3 WATERCOURSE LOSS AND GAIN

3.1.1 The loss of open watercourse due to culverting and gains due to watercourse diversion or culvert removal are **summarised in Table 2**.

Table 2: Balance of Watercourse Loss and Gains

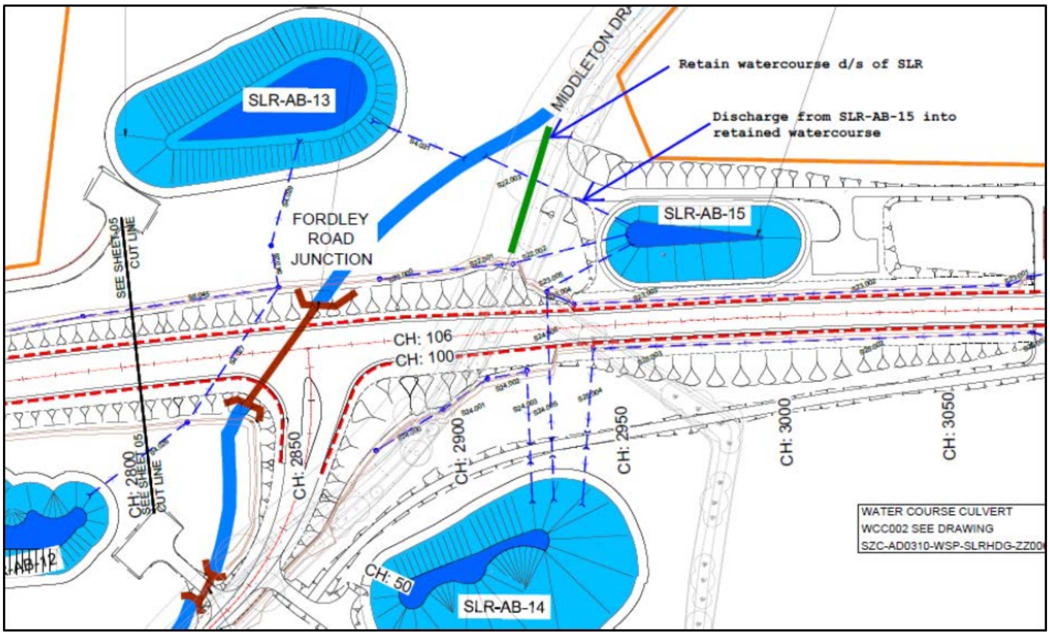
Crossing Number and/or Diversion and/or Culvert	Watercourse Number	Watercourse Name	Watercourse Loss metres	Watercourse Gain metres
1 Replacement culvert (extended)	1	Middleton Drain	39	-
Watercourse Diversion	1	Middleton Drain	126	170
2 New culvert	2	Garden House Farm Drain	38	-
3 New culvert	3	Hawthorn Road Drain	36	-
5 Replacement culvert	5	Pretty Road Drain	34	10
Watercourse Diversion	5	Pretty Road Drain	-	300
6 New culvert	6	Theberton Watercourse	24	-
Watercourse Diversion	6	Theberton Watercourse	-	420
7 New culvert	7	Fishpond Grove Drain	36	-
Land drainage ditch 1. New culvert	-	-	48	-
Land drainage ditch 2. New culvert	-	-	58	-
Land drainage	-	-	72	-

Crossing Number and/or Diversion and/or Culvert	Watercourse Number	Watercourse Name	Watercourse Loss metres	Watercourse Gain metres
ditch 3. New culvert				
		Combined Total	**511**	**900**

3.1.2 It can be seen that as a result of the requirement for diverting part of Middleton Drain to accommodate the Fordley Road slip road and the tributary watercourse at Pretty Road, there is a significant net increase in watercourse as a result of construction the Sizewell link road.

3.1.3 The Middleton Drain diversion is shown in **Plate 3**. The length upstream of Sizewell link road is abandoned but the length downstream shown green is proposed to be retained and expanded upon to create wetland habitat.

Plate 3: Middleton Drain Watercourse Diversion



3.1.4 The Pretty Road tributary diversions are shown green in **Plates 4 and 5**.

Plate 4: Pretty Road Drain Watercourse Diversion West to Pretty Road Drain

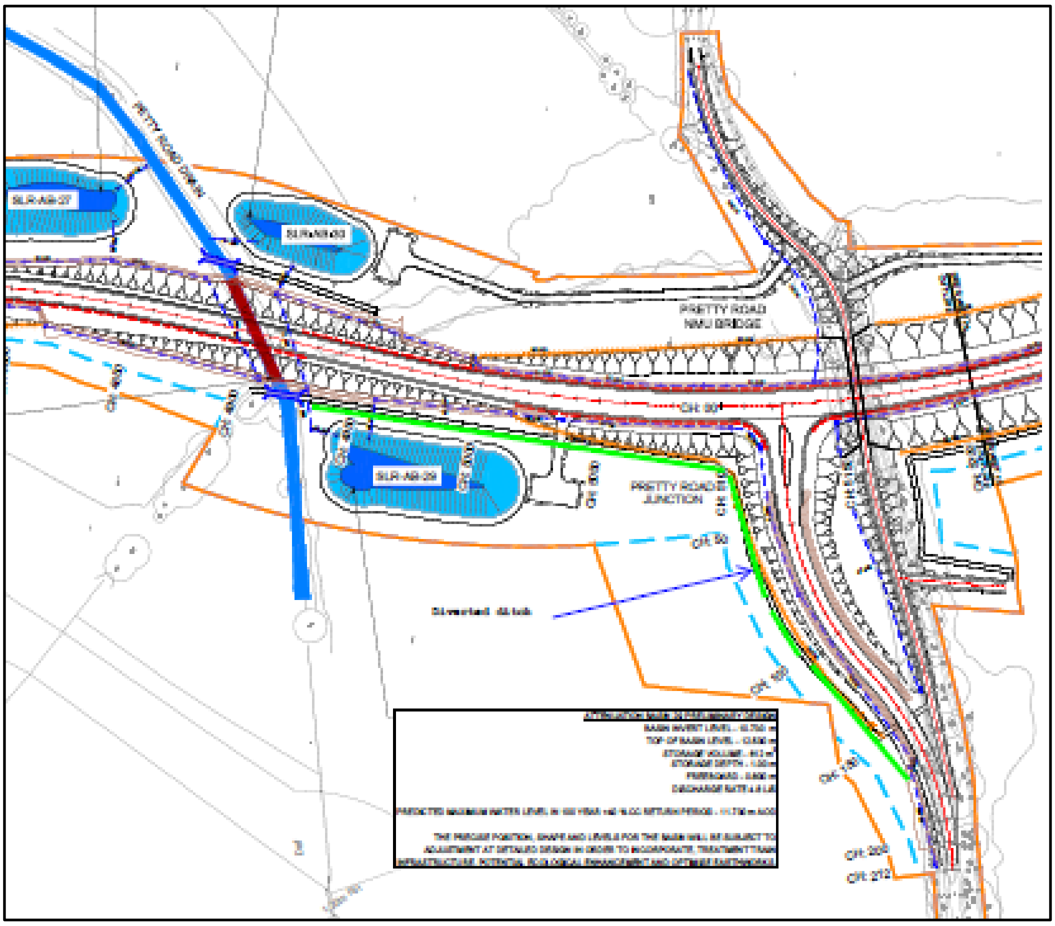
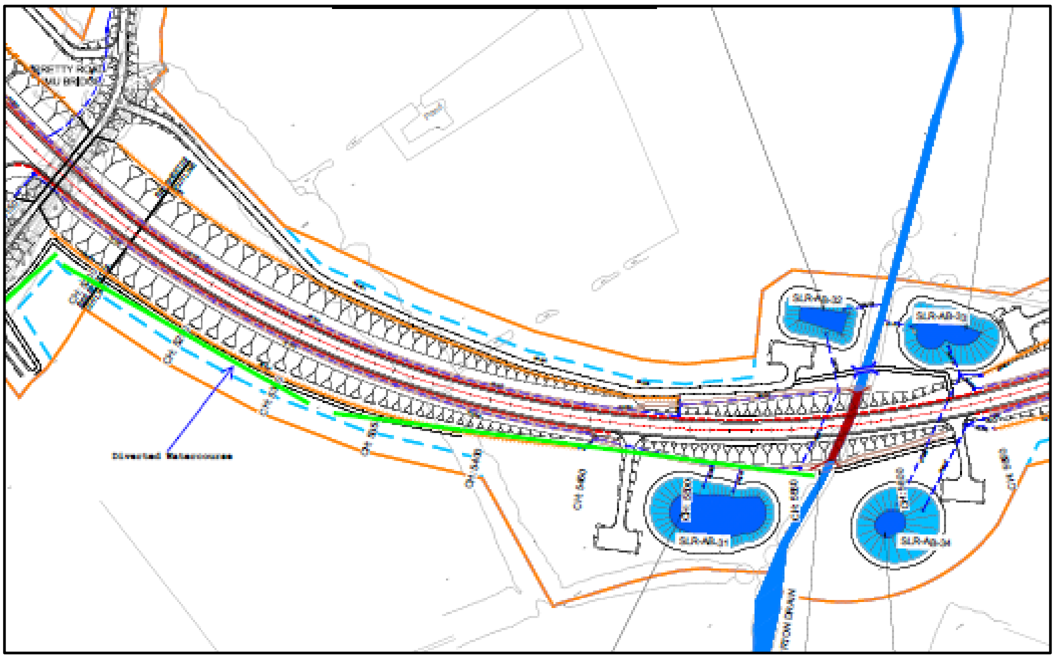


Plate 5: Pretty Road Drain Watercourse Diversion East to Theberton Watercourse



4 POTENTIAL FOR WATERCOURSE ENHANCEMENT

4.1.1 The watercourses impacted by the Sizewell link road are of varying size and significance in terms of conveyance of flows. Middleton Drain and Theberton Watercourse are classed as main river and are observed to normally have a continuous flow. The remainder are classed as ordinary watercourses and have been observed to be ephemeral.

4.1.2 Further engagement was undertaken with the EA in July 2021 at which it was agreed that SZC Co. would develop proposals to enhance the existing and diversion watercourses as far as possible, within existing constraints and order limits, to mitigate habitat loss and maximise biodiversity.

4.1.3 The EA directed SZC Co. to the following references: “River Rehabilitation Guidance for Eastern England Rivers” dated November 2005; and “Intermittent rivers and ephemeral streams: what water managers need to know” published by the Science & Management of Intermittent Rivers & Ephemeral Streams (Ed. Claire Magand et al., June 2020) which are noted.

4.1.4 SZC Co. is committed to mitigating the impact of loss of watercourses and delivering enhancement of the existing watercourses within the extent of land which will form part of permanent land take for the Sizewell link road in order to offset these losses and deliver overall biodiversity net gain. This land will transfer to SCC upon adoption of the road. The land take is typically 50 m upstream and downstream of the proposed new portal culverts. In addition, SZC.Co. commits to include natural enhancement features within the three watercourse diversions shown on Plates 3, 4 & 5 above. At Middleton drain, the retained section of ditch will be augmented with new wetland habitat such as a scrape to be provided within the triangular area bounded by the existing retained and proposed new diverted watercourse.

4.1.5 The design of these natural enhancement features will be included in Detailed Design for the SLR drainage scheme, and both the EA and SCC will be invited to comment on the proposals during design development.

4.1.6 It is anticipated that the features will include, but not be limited to:

- Varying channel width and bank gradient
- Creation of irregular pools of varying depth to create habitat mosaic
- Backwaters and side channels
- Berms
- Bends
- Woody dams and other natural obstructions

4.1.7 Whilst including enhancement features in Detailed Design it will be important to also ensure that there is no adverse impact of flow conveyance and increase in off-site flood risk to adjacent land.

5 REQUIRED HIGHWAY DRAINAGE SUDS INFRASTRUCTURE LANDSCAPING AND HABITAT ENHANCEMENT

5.1.1 In accordance with the SCC adoptable standards referenced in 1.1.5 above the Sizewell link road design incorporates SuDS drainage that has landscaping and habitat value. As stated in the SuDS Pallet "Landscape planting should be done to both replicate existing habitat, provide treatment of the surface water, offer biodiversity and amenity value. However, the planting should be done to recreate new habitat where appropriate so that it is adaptable to climate change".

5.1.2 The Sizewell link road design that was originally submitted as part of the DCO application included proposed landscaping plans and drainage features including a number of infiltration basins and swales. However, ground investigations carried out subsequently confirmed that infiltration was not feasible. The drainage design has therefore been updated in favour of attenuation basins. An estimated 34 attenuation basins are proposed that would generally drain to vegetated channels and swales. The drainage infrastructure will require to be kept separate from the existing watercourse in order to ensure a satisfactory level of treatment prior to disposal.

5.1.3 Landscaping and habitat creation in accordance with the recommendations contained in the SuDS Manual and the SuDS palette will be developed as part of Detailed Design.

5.1.4 Where space permits the final outfall from attenuation basin to watercourse discharge point will be constructed in open channel to assist with enhancement of the watercourse.

6 SUMMARY AND CONCLUSION

6.1.1 The purpose of this note is to quantify the losses and gains of watercourses that result from the construction of Sizewell link road and to set out proposed mitigation and enhancement measures to offset any losses.

6.1.2 The proposed drainage works as outlined in this report would result in a **net gain** of approximately 389m of watercourse habitat (see Table 2).

6.1.3 All new ditches would be designed to maximise their ecological function and biodiversity, alongside their hydraulic and other technical requirements.

6.1.4 In addition, an estimated 34 attenuation basins would be constructed as part of SuDS. These basins and associated drainage channels would also be designed to maximise ecological function and biodiversity through use of SCC's SuDS palette.

APPENDIX D: COLLISION RISK BETWEEN BIRDS AND POWER LINES

CONTENTS

1 COLLISION RISK BETWEEN BIRDS AND POWER LINES

1.1 Natural England's comment

1.1.1 Issue 7 within Part II of Natural England's Written Representation [REP2-153] relates to physical interaction between species and project infrastructure, with collision risk to birds due to new pylons and overhead power lines being the outstanding issue described in Natural England's Written Representation. In relation to Special Protection Areas (SPAs), Natural England specify the above concern for the Alde-Ore Estuary SPA, Minsmere-Walberswick SPA and Outer Thames Estuary SPA.

1.1.2 Natural England refers to the Pylon Plans for Approval document [APP-019] which includes a drawing illustrating the arrangement of the new power lines, generally running along a north-south alignment along the western edge of the main development site and the existing Sizewell B station, and connecting into the National Grid powerlines.

1.1.3 Natural England outlines three potential pathways for impact on birds due to the presence of powerlines, summarised as follows:

- Electrocution – this can occur when larger birds cause a short circuit by touching two live wires. However, Natural England add that larger pylons, such as those proposed at Sizewell C, typically have bigger spaces between live components, reducing the risk of electrocution.
- Displacement – Natural England states that birds can be displaced through:
  - direct habitat loss linked to construction.
  - indirect habitat loss if birds avoid the structure (presumably referring to pylons) due to its physical presence.
  - avoidance linked to increased predation risk, should pylons provide perches or nest sites for predators.
  - disturbance due to construction and maintenance.
  - barrier effect preventing birds accessing foraging and roosting areas.

Having raised the above potential pathways for effect, Natural England goes on to state that as the new pylons and powerlines are contained within either the proposed, or existing, development footprint, then direct loss, avoidance, disturbance and barrier effects will not be as pronounced, when considered against a baseline level of anthropogenic effect already affected by the presence of Sizewell B, and the potential for effects already considered as part of the proposed main development site for Sizewell C.

- Collision – Natural England states that mortality through collision with power lines, however, has not been considered as part of the assessment. Given the wording of Natural England's comments regarding collision risk in relation to the comments on electrocution and displacement, it is assumed that the potential for collision is the area on which Natural England requires further consideration; this assumption is supported by Natural England's comments as ISH7 and at a subsequent consultation meeting held on 21 July 2021.

2 SZC CO. RESPONSE

2.1 SZC Co. response at Deadline 3

2.1.1 SZC Co. provided a response to this issue within Natural England's Written Representation at Deadline 3, which essentially reiterated the position set out in response to Natural England's earlier Relevant Representation. This response is reproduced below as it provides a summary of SZC Co.'s overall position on this matter.

"SZC Co. has not identified a likely pathway for a material effect due to collisions of birds with overhead powerlines. In relation to overhead powerlines, ***paragraph 14.12.15*** *of* ***Volume 2, Chapter 14 (Terrestrial Ecology and Ornithology)*** *of the ES [AS-033] identifies that the development proposals require the repositioning of one existing overhead pylon and four new overhead gantries. This extent of change to the baseline situation is minimal in the context of the existing powerlines and cabling that are already in place within the complex and across the wider area and represents little potential for any additional effects on SPA bird populations. Furthermore, all new pylon and gantries would be located within the footprint of the main platform in areas that are likely to be avoided by birds because of the absence of suitable habitats in such locations and the presence of anthropogenic activities."*

2.2 Further analysis of collision risk

2.2.1 In light of Natural England's continued concern regarding collision risk, further consideration of the points raised in Natural England's Written Representation has been undertaken. The following provides further response, based on the detail provided in Natural England's Written Representation.

a) Routing of power lines

2.2.2 Natural England comments that *"bird collisions are often concentrated along relatively short sections where several factors interact to create a collision problem or 'hotspot'. The factors that create a hotspot may not always be apparent, but SPAs, SSSIs, Ramsar sites or known flight paths that connect bird habitats should be avoided at the routing stage"*.

2.2.3 This comment is more relevant to the consideration of routing options for a long section of power line rather than the routing of power lines that are required for the Sizewell C Project. The Sizewell C Project only requires the extension of the existing National Grid connection that currently runs to

Sizewell B and new power lines interconnecting the new pylons within the envelope of Sizewell C. This arrangement is illustrated on the Pylon Plans for Approval [APP-019], with a section of a plan from that document inserted below as **Plate 1.1** for ease of reference (blue = existing overhead line; red = proposed overhead line).

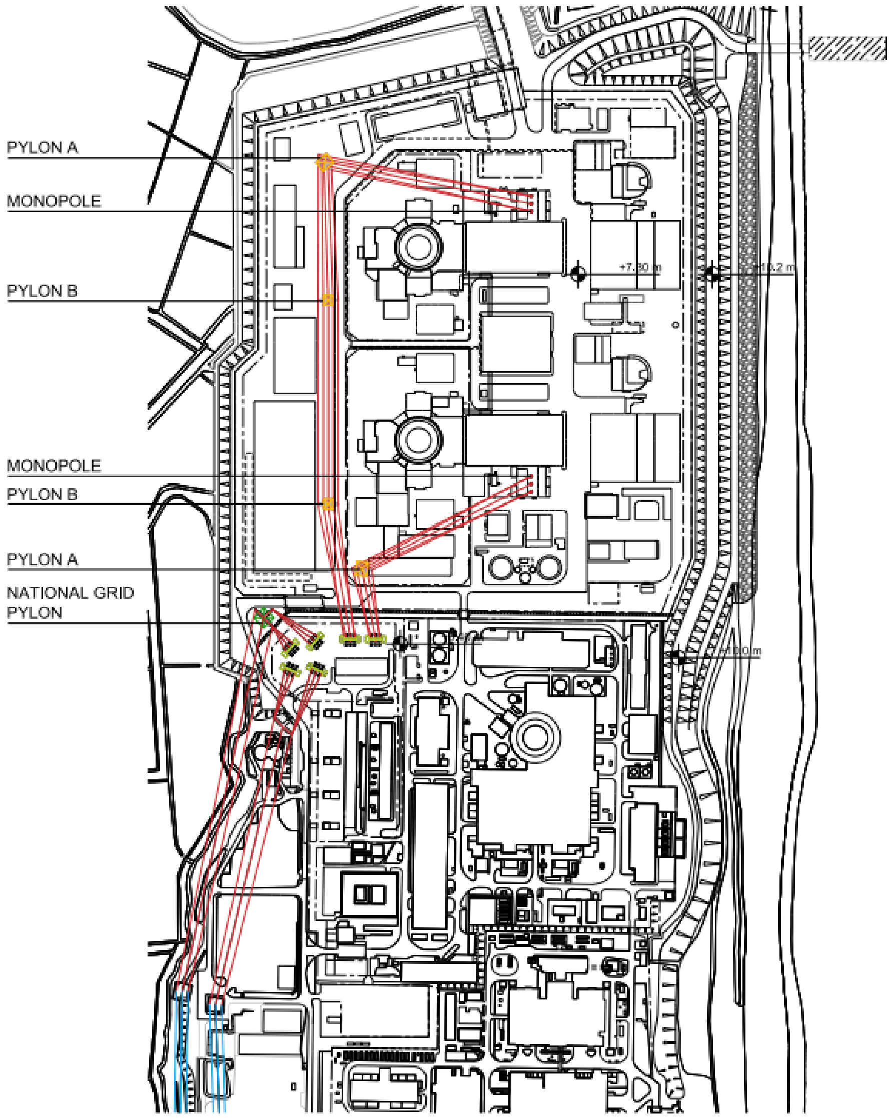


Plate 1.1: Arrangement of pylons and power lines

2.2.4 It can be seen that the routing of the power lines necessary for the Sizewell C Project is essentially limited by the location of the power station in relation to the connection point to the National Grid. Options for routing are 'internal' to the development boundary and there are no variations on the proposed routing that would be materially different to each other in terms of collision risk posed to birds.

b) Height of power lines

2.2.5 Natural England comments that a plan is not provided:

"in cross-section to show the height of powerlines relative to buildings and, consequently, the degree to which powerlines protrude from, or are screened by, the outline of adjacent development. For example, owing to morphology and their gregarious behaviour, swans and large waterbirds are at greater risk of collision with powerlines. Potentially, waterbirds moving between freshwater and coastal habitats, or flying between wetland habitats along the coast, must gain sufficient elevation to fly over the intervening visible buildings, becoming concentrated at collision risk height of the less-visible high-voltage powerlines".

2.2.6 **Plates 1.2 and 1.3** are extracted from the Design and Access Statement (Part 2 of 3) [APP-586]. The plates show the relationship between the pylons and power lines and other buildings and structures proposed as part of the Sizewell C Project in cross section (**Plate 1.2**) and plan view (**Plate 1.3**).

2.2.7 It can be seen from **Plate 1.2** and **Plate 1.3** that although the power lines are visible above the level of surrounding buildings and structures proposed as part of the Sizewell C Project, the power lines are in close proximity to the reactor buildings (labelled '1' on **Plate 1.3**) and within the mass of the buildings and structures comprising the Sizewell C Project as a whole.

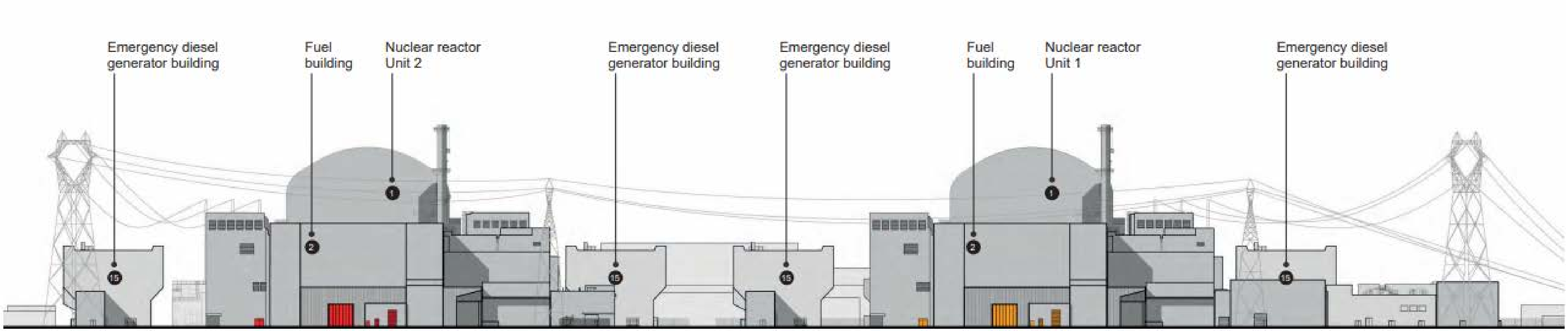


Plate 1.2: Arrangement of pylons and power lines relative to buildings and structures (cross section)

Plate 1.3: Arrangement of pylons and power lines relative to buildings and structures in the main development site

2.2.8 In terms of relative maximum heights of the pylons and surrounding buildings and structures (as defined in **Table 2.1** of **ES Volume 2 Main Development Site, Chapter 2 Description of Permanent Development** [APP-180]), the maximum height of the two reactor buildings (labelled '1' on **Plate 1.3**) is 72 m above Ordnance Datum (AOD).

2.2.9 The structures in the conventional island (the zone marked orange on **Plate 1.3**) vary in maximum height from 32m AOD for the sky bridges (labelled '18' on **Plate 1.3**) to 57m AOD for the two turbine halls (labelled '17' on **Plate 1.3**).

2.2.10 The two groups of monopoles, which have a maximum height 55m AOD, are immediately adjacent to the turbine halls. The power lines from the monopoles run to the two pylons labelled 'Pylon A' on **Plate 1.1**, which have a maximum height of 75m AOD (although APP-180 notes that it is likely that a 59m AOD pylon will be constructed at these locations). The two pylons labelled 'Pylon B' on **Plate 1.1** have a maximum height of 59m AOD.

2.2.11 It can be seen from **Plates 1.1, 1.2** and **1.3** and the analysis above that the pylons (and consequently) the power lines are located in close proximity to other structures of comparable or greater height and are located within the overall envelope / massing of the Sizewell C site (a point which is recognised by Natural England in its Written Representation).

2.2.12 The location of the Sizewell C Project to the south of the Minsmere-Walberswick SPA and Ramsar site and to the north of the Alde-Ore Estuary SPA would mean that any interchange of birds that may occur between these sites would be in a north-south direction, which is parallel to the alignment of the highest pylons and power lines. The east-west running power lines are adjacent to the two reactor buildings, and would run at a lower level than those structures.

2.2.13 For qualifying features (breeding little tern, common tern and non-breeding red-throated diver) of the Outer Thames Estuary SPA, which is located in the coastal zone to the east of the Sizewell C Project, there is very unlikely to be any significant interchange of these species between the coastal zone, across the location of the Sizewell C Project to the west, due to the lack of preferred habitat for these species to the west. Combined with the points made above regarding relative heights of the power lines and the buildings and structures comprising the Sizewell C Project, there is no realistic potential for collision risk for birds associated with the Outer Thames Estuary SPA.

2.2.14 With reference back to the core of Natural England's concern with regard to collision risk (i.e. *"Potentially, waterbirds moving between freshwater and coastal habitats, or flying between wetland habitats along the coast, must gain sufficient elevation to fly over the intervening visible buildings, becoming concentrated at collision risk height of the less-visible high-voltage powerlines"*), on the basis of the above analysis, it can be concluded that birds (if they were to fly across the main development site) would detect and respond the structures and buildings comprising the Sizewell C project, gaining elevation to avoid these structures (including the pylons. Although the power lines would be less visible than these structures, the combination of the fact that the power lines are in close proximity to the other structures and buildings, at a similar or lower elevation and not likely to interact with bird flight lines, would mean that there would be no risk of "birds *becoming concentrated at collision risk height of the less-visible high-voltage powerlines".*

c) Mitigation

2.2.15 Notwithstanding the above conclusion, as a precautionary measure, it is proposed that line markers will be installed on the power lines to minimise the risk of bird collision with power lines. SZC Co. will update the design principles to include reference to the proposed line markers, subject to operational and technical requirements and consideration of the views of key stakeholders, including National Grid.

APPENDIX E: ALC LAND TAKE SUMMARY TABLE

1 AGRICULTURAL LAND CLASSIFICATION - LAND TAKE SUMMARY TABLES

1.1 Ag. 1.0 – Response from Natural England at Deadline 2

1.1.1 *'Based on the information provided with the application documents, it appears that the proposed development comprises 583.28 ha of agricultural land, including 143.3 ha classified as 'best and most versatile' (BMV) (Grades 1, 2 and 3a in the Agricultural Land Classification (ALC) system). We understand that, of the 143.3 ha of BMV land which will be affected by the proposals during construction (10-12 years), 67.6 ha of this will be permanently and irreversibly lost following removal and reinstatement of temporary development at the end of the construction phase. The land take figures provided in 6.11 Volume 10, Cumulative and Transboundary Effects, Chapter 3 Assessment of Project-wide Effects [APP-577] show discrepancies between individual ES Soil chapter.* ***We advise that the Applicant should provide simple breakdowns in this summary for each of the individual components. For example, total agricultural area impacted by scheme (split by scheme component and by ALC grade), total area of BMV agricultural land (split by component) and total BMV agricultural area permanently and temporarily required for the development (split by component).*** *The main impact on BMV appears to be the in relation to the ancillary development rather than the main development site. The loss of BMV land can only be considered temporary if it can be restored back to its original quality – given some of the development proposed (e.g. rail works involving cut and fill earthworks or roadways involving compacting basal layers and the application of tarmac, paving etc) is somewhat doubtful and greater justification is required as to how the soil will be restored back to its original quality post development. Furthermore, it is not clear how the route options or site design has been devised to help minimise this loss.'*

1.1.2 The highlighted request is responded to in the below tables. Areas stated are based on the January 2021 Addendum where land take areas changed slightly due to minor changes to the project proposals.

Table 1

ALC Grade	Main Development Site			Northern Park & Ride			Southern Park & Ride		
	Total area (ha)	Area required permanently (ha)	Area to be returned to pre-construction land use (ha)	Total area (ha)	Area required permanently (ha)	Area to be returned to pre-construction land use (ha)	Total area (ha)	Area required permanently (ha)	Area to be returned to pre-construction land use (ha)
1	0	0	0	0	0	0	0	0	0
2	3.9	0.6	3.3	0	0	0	0	0	0
3a	18.6	5.0	13.6	21.8	0	21.8	5.4	0	5.4
3b	66.3	0.4	65.9	4.5	0	4.5	7.9	0	7.9
4	110.9	2.5	108.4	0	0	0	4.2	0	4.2
5	0	0	0	0	0	0	0	0	0
Non-agricultural	159.2	69.8	89.4	1.7	0	1.7	8.9	0	8.9
Not surveyed	14.3	0.0	14.3	0	0	0	0	0	0
Total land area	**373.2**	**78.3**	**294.9**	**28.0**	**0**	**27.9**	**26.4**	**0**	**26.4**
Total agricultural land take	**214.0**	**8.5**	**205.5**	**26.3**	**0**	**0**	**17.5**	**0**	**0**
Total BMV land affected	**22.5**	**5.6**		**21.8**	**0**		**5.4**	**0**	

Table 2

ALC Grade	Two Village Bypass			Sizewell Link Road			Yoxford		
	Total area (ha)	Area required permanently (ha)	Area to be returned to pre-construction land use (ha)	Total area (ha)	Area required permanently (ha)	Area to be returned to pre-construction land use (ha)	Total area (ha)	Area required permanently (ha)	Area to be returned to pre-construction land use (ha)
1	0	0	0	0	0	0	0	0	0
2	2.0	1.9	0.1	10.4	10.1	0.3	0	0	0
3a	25.2	18.8	6.4	40.9	33.2	7.7	0	0	0
3b	19.5	15.3	4.2	28.4	22.7	5.7	1.6	1.26	0.34
4	0.6	0.2	0.4	0	0	0	0.3	0.3	0
5	0	0	0	0	0	0	0	0	0
Non-agricultural	4.5	4.0	0.5	8.2	7.9	0.3	1.0	1.0	0
Not surveyed	3.3	3.0	0.3	21.0	18.8	2.2	0	0	0
Total land area	**55.1**	**43.2**	**11.9**	**108.9**	**92.7**	**16.2**	**2.9**	**0**	**0**
Total agricultural land take	**50.6**	**39.2**	**11.4**	**92.8**	**84.8**	**15.9**	**1.9**	**1.56**	**0**
Total BMV land affected	**27.1**	**20.7**		**65.1**	**43.3**		**0**	**0**	

Table 3

ALC Grade	Freight Management Facility			Rail		
	Total area (ha)	**Area required permanently (ha)**	**Area to be returned to pre-construction land use (ha)**	**Total area (ha)**	**Area required permanently (ha)**	**Area to be returned to pre-construction land use (ha)**
1	1.4	0	1.4	0	0	0
2	0	0	0	0	0	0
3a	6.2	0	6.2	8.6	0	8.6
3b	1.8	0	1.8	11.7	0	11.7
4	0	0	0	1.7	0	1.7
5	0	0	0	0	0	0
Non-agricultural	1.6	0	1.6	1.0	0	1.0
Not surveyed	0	0	0	0	0	0
Total land area	**11.0**	**0**	**11.0**	**23.0**	**0**	**23.0**
Total agricultural land take	**9.4**	**0**		**22.0**	**0**	**22.0**
Total BMV land affected	**7.6**	**0**		**8.6**	**0**	

APPENDIX F: TECHNICAL NOTE ON EAV AND STOCK SIZE

CONTENTS

1 TECHNICAL NOTE ON EAV AND STOCK SIZE

1.1 Introduction

1.1.1 This Technical Note sets out the SZC Co. position on two key parameters in the assessment of effects on the sustainability of fish populations. It has been prepared on behalf of SZC Co. by the Cefas (Centre for Environment Fisheries and Aquaculture Science) which is an Executive Agency of the Department for Environment, Food & Rural Affairs (Defra). Cefas provides evidence and advice for the UK Government and other bodies relating to marine and freshwater science, as well as conducting research and development relevant to Cefas' mission (see www.cefas.co.uk). The two parameters are interrelated. The first relates to the application of Equivalent Adult Values (EAV) used to convert an annual rate of loss due to entrapment of predominantly juvenile fish into an annual rate of loss of fish that would naturally survive to maturity and join the spawning population. The loss of equivalent adult fish is then compared to the relevant spawning stock or population. As such, defining the relevant stock or population comparator is also a central step in the process.

1.1.2 This Technical Note serves as a summary of the salient points which are described in greater detail both in a number of technical reports signposted herein and responses submitted as part of the Application. SZC Co. wishes to bring to the attention of the ExA the large body of work dealing specifically with EAVs and stock areas that formed a large part of the ongoing Hinkley Point C Water Discharge Activity (WDA) Appeal Inquiry. The evidence was examined and cross-examined in detail during the course of a 9 day inquiry hearing from 8 - 24 June 2021. Located on the open North Sea coast in Suffolk, Sizewell C is a different setting and, in many cases, would impact different fish populations than Hinkley Point C, which is situated in the outer Severn Estuary. However, the detailed evidence provided in support of the Hinkley Point C WDA Appeal Inquiry, including the main Proof of Evidence of Dr Jennings[1] of Cefas (Centre for Environment Fisheries and Aquaculture Science) and the Rebuttal Proof of Evidence of Dr Simon Jennings[2] on EAVs and the underlying principles of defining stock areas is analogous in the two developments.

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[1] Proof of Evidence of Simon Jennings: CD 6.12 Proof of evidence of Simon Jennings (Entrapment and Fish Populations) https://ea.sharefile.com/share/view/sa19a55d9c0d241fb85c01f77f39c55ac
CD 6.12b Appendix A - Equivalent Adult Value
https://ea.sharefile.com/share/view/s43cc1866b0c54e3da9dff60998aa6bf1
CD 6.12g Appendix F - Application of stock assessment
https://ea.sharefile.com/share/view/s37450741fe0647eabf4ed8121a2b4421

[2] Rebuttal Proof of Evidence Simon Jennings: CD6.19
https://ea.sharefile.com/share/view/se7167ce2cd7040fab807c5d65fe76498

1.2 Equivalent Adult Values (EAV)

1.2.25 Prior to considering the EAV approach or alternative methods in more detail, it is first worth considering what the assessments of impingement and entrainment, collectively termed entrapment, is trying to achieve. This is important as it allows the connection to be made between the fish in the Greater Sizewell Bay that may become entrapped at Sizewell C and their wider populations.

1.2.26 Most fish have dramatically different reproductive strategies to mammals and birds. Congregating at spawning sites, a mature female can produce tens of thousands to millions of eggs. The proportion of eggs that hatch into larvae, and of larvae that survive to become juveniles, will vary considerably from year to year. For population stability to occur, 1 for 1 replacement is required. As one adult fish dies, a new fish joins the spawning population to replace it. Fish early life-history stages have very high mortality rates, with very low probability of becoming adults, and the reproductive strategy of producing a great many offspring has evolved to counter this.

1.2.27 The impingement of fish at Sizewell B varies seasonally and for most species is comprised predominantly of juvenile stages. High natural mortality of these fish means that most of the impinged fish would not naturally survive to contribute to the adult spawning population in the absence of the station anyway. On this basis it is widely accepted that the losses of early-life history stages need to be converted into equivalent adults to represent the effects of the station in the context of the spawning population.

1.2.28 The Cefas (Centre for Environment Fisheries and Aquaculture Science) EAV method involves a forward projection of annual impingement mortalities, accounting for natural mortality, to give an equivalent annual rate of loss of mature fish. It is a straightforward adjustment to reflect the likelihood of entrapped fish reaching maturity and contributing to the spawning population.

1.2.29 EAV factors are multiplied by numbers of impinged or entrained fish to estimate the number of equivalent adults that are lost (the EAV number), or multiplied by numbers of impinged fish and the individual body weight of mature fish in the population to give an EAV biomass. Importantly, EAV numbers and biomass are expressed as annual rates. The EAV approach is a form of risk assessment whereby estimates of annual EAV numbers or biomass as a proportion of the spawning population size can be used to assess if the annual rate of impingement mortality poses a risk to population sustainability relative to pre-defined thresholds[3].

1.2.30 An advantage of the EAV method is that it is not as data demanding as more complex methods of population assessment (e.g. stock assessment). This advantage allows it to be applied to many species to screen for risks, as done by SZC Co. when assessing the effects of entrapment for Sizewell C.

1.2.31 There is inbuilt precaution in the EAV factors. One precautionary assumption is that the EAV assumes no fisheries mortality of the juvenile stages. By assuming no fishing mortality before first maturity, the EAV assessment overestimates the chance of survival to maturity, particularly for species such as cod, whiting and sea bass.

1.2.32 Furthermore, the EAV biomass is calculated by multiplying the EAV number by the mean adult fish weight from the spawning population. The individual weight at the age at first maturity will be lower than the individual weight of older and more fecund fish in the spawning population. Therefore, the EAV biomass upweights apparent losses of spawner biomass due to entrapment and their potential contribution to the spawning population biomass. This correctly results in a precautionary higher rate of annual EAV biomass loss as a percentage of spawning population biomass for repeat spawning species.

1.2.33 For species where there are very low numbers recorded in impingement samples or where there are insufficient biological data to determine an EAV, an EAV of 1 has been applied – this is the maximum value possible and assumes every fish entrapped would normally survive to maturity and join the spawning stock (and is therefore precautionary). Notably, this assumption was made for twaite shad, river lamprey and European eel. This assumes all fish of these species would contribute to the spawning population. River lamprey and European eel are semelparous, meaning they only spawn once before dying, therefore an EAV of 1 is the maximum theoretical number. In the case of eels, no adult fish (silver eels) have been recorded from impingement sampling at Sizewell B during eight years of sampling in the period 2009-2017. Equally for twaite shad, most of the specimens impinged at Sizewell B are below the size of maturity.

b) Spawning Production Foregone (SPF)

1.2.34 The Environment Agency has recommended an extension to the EAV method termed Spawning Production Foregone (SPF). The SPF extension

[3] BEEMS Technical Report TR406.v7 Section 5.1 [AS-238].

builds upon the EAV by adding the probability of repeat spawning whereby some species may spawn more than once over a number of years.

1.2.35 In accounting for repeat spawning, the assessment necessarily estimates a multiannual rate of losses and not an annual one. The issue with the SPF extension is how to relate the multi-annual summed losses against a relevant annual population threshold. Critically, as it is not an annual rate, the SPF cannot be compared against an annual spawning population. To do so would result in inflated estimates as losses are compiled over multiple years (repeat spawning).

1.2.36 A second important issue with the application of the SPF extension is the need to deal with fishing mortality. The Cefas EAV approach is already precautionary in that is assumes no mortality of the juvenile stages. To extend this assumption to the adult stages introduces over-precaution. For example, sustainable fishing mortality reference values vary in well studied commercial fish species between 19% for sea bass to 36% for plaice above natural mortality for the stocks of relevance to Sizewell (Table 10 in BEEMS Technical Report TR406.v7 [AS-238]). In their Relevant Representations [RR-0744], the MMO raise this point regarding the appropriate application of EAV approaches, acknowledging that both methods are precautionary but that *"care needs to be taken to avoid an over-precautionary approach"*. In their review of the EAV approaches, the MMO conclude [RR-0744]:

"The MMO consider the core method [Cefas EAV method] *is the better in that the end-point age is more likely to be reflective of reality in the context of currently fished seas, and because the MMO consider the extension method, while very precautionary, has conceptual challenges for EAV>1*[4] *and problems for comparing to SSB. The MMO is comfortable that all due efforts have been made to secure data at an appropriate scale."*

1.2.37 SZC Co. is confident that the EAV risk assessment approach provides a suitable precautionary assessment to determining if the annual rate of impingement mortality poses a risk to the population.

1.2.38 If annual rates of EAV biomass were to approach or exceed pre-defined thresholds for population sustainability, further assessment may be undertaken. A powerful analytical tool available for data rich species is to run a full ICES stock assessment whereby annual impingement from the station can be added as a source of mortality to the stock over multiple years to determine if the long-term impact of the station could affect population trends. Such data demanding approaches are not available for

[4] It should be noted that for many of the conservation species, a precautionarily EAV of 1 has been applied.

many of the species assessed at Sizewell and are restricted to data rich, typically commercially exploited species.

1.2.39 As part of the Deadline 6 submissions, SZC Co. has provided an analysis of the sensitivity of entrapment predictions to uncertainties primarily in mitigation efficiency (**BEEMS Scientific Position Paper SPP116** (Doc Ref. 9.67). The uncertainty analysis provides further evidence that Sizewell C would not have significant effects on the population sustainability of any of the key species assessed. However, to provide the highest level of confidence available in the assessment of no significant effects SZC Co. has committed to completing a full ICES stock assessment for sea bass based on precautionary assumptions which will be provided at Deadline 8. Sea bass was selected for the stock assessment on the basis that it is a data rich species with a well-established stock model available. Sea bass is the 4th most impinged species at Sizewell B and has been subject of stakeholder concerns pertaining to the stock area. Furthermore, when the distribution of the species within the Greater Sizewell Bay is not accounted for it is also the species with the highest percentage predicted effect due to Sizewell C (**BEEMS Scientific Position Paper SPP116** (Doc Ref. 9.67).

1.3 Stock Size

1.3.1 Entrapment of fish in the coastal waters of Sizewell is driven by recruitment[5] of larvae, utilisation of inshore nursery areas by juvenile life stages and, for older fish, by their seasonal migratory movements in to and out of the Greater Sizewell Bay.

1.3.2 The young fish impinged at Sizewell are overwhelmingly the progeny of adult fish that have spawned elsewhere, and predominantly offshore[6]. Larval recruitment is driven by meteorological, oceanographic and ecological processes. Variability in these factors mean the locations and numbers of young fish reaching coastal areas varies year to year. In any given year, the number of young fish in the Southern North Sea, and ultimately the proportion of these in Greater Sizewell Bay, will be driven by two main factors. First, the total fertile egg production of the spawning population. Second, the survival and distribution of eggs and larvae as they develop and drift towards the coast.

1.3.3 As the larvae begin the transformation into juveniles, they more actively seek suitable nursery habitats. The young fish that recruit to coastal areas including the Greater Sizewell Bay are not consistently connected to the same subset of spawning adults. Following spawning, eggs may be carried

[5] The number of fish reaching a specified stage of the life cycle at a given point in time.

[6] Further information on spawning and nursery areas in provided in BEEMS Scientific Position Paper SPP103 [DCO Ref. XX], within the Marine Ecology and Fisheries Environmental Statement [APP-317]

passively for 10s or 100s of km over 30 days or more. The eggs and larvae will intermingle in different ways in different seasons and years, and consistent spatial differentiation between larvae from different individuals or groups within the same spawning population will not be consistently maintained. This is expected to be the case even if there is structuring and separation among individuals and groups in the spawning aggregations.

1.3.4 Therefore, when determining the relevant population to contextualise impacts it is essential to consider the full life history of the fish. This is consistent with the International Council for Exploration of the Seas (ICES) approach that considers the population identity over the full life cycle when determining management units for fish stocks. Consideration of the full life-history is also compatible with the equivalent adult methodologies.

1.3.5 SZC Co considers ICES stock areas to be the most robust application of the evidence for determining population units for commercially harvested data-rich species. ICES has a remit to develop science and advice to support the sustainable use of the seas and oceans. ICES is a network of around 5,000 experts from around 700 institutes and organisations in 20 member countries and beyond, facilitated by a secretariat based in Copenhagen. In determining the relevant stock units, ICES assesses all the available evidence across the entire life-history of the species of concern throughout its full life-cycle including spawning migrations, larval dispersal and patterns of recruitment. The ICES approach is a multistage international process with internal and external peer review that brings together experts in fish biology. Methods of assessments of each stock and its structure is considered by dedicated international working groups. Meeting every 3-5 years at so-called 'Benchmarks' all the new evidence on the species ecology and distribution is taken into account. The ICES Benchmark process is in addition to annual assessments and evaluates current assessments and data methodologies and proposes improvements. Where such evidence is available the SZC Co. refers to the higher authority of ICES.

1.3.6 It is noteworthy that in its Written Representation submission, the MMO [REP2-140] states, emphasis added:

"In relation to the scale of assessment, the MMO notes that the Applicant continues to justify the use of the International Council for Exploration of the Sea ("ICES") stock areas as using the best available evidence. ***The MMO concludes that the use of ICES stock areas for commercial fish species represents the current best scientific evidence available. There is currently no robust information that would support use of more local stock areas in the assessment.****"*

1.3.7 In their Written Representations, Natural England [REP2-153] and the Environment Agency [REP2-135] have disputed the application of ICES stock areas pointing to finer population structure and highly localised behaviours. SZC Co. has reviewed the species-specific concerns and provided formal responses. The stock comparator for each of the key species at Sizewell is provided in **SPP103 Rev 5** (submitted at Deadline 6; Doc Ref. 6.14(A)) which collates the comments from statutory stakeholders on each of the species of concern.

1.3.8 For non-commercial species and those not covered by ICES advice, or where more appropriate population comparators are available, these have been applied by the Applicant. It is appropriate to point out that SZC Co. and the Environment Agency agree on the population units for the assessment of effects on river lamprey and European eel.

1.3.9 SZC Co. is confident that the approach to both commercial and non-commercial species provides a robust approach to determining the population level effects from Sizewell C.

APPENDIX G: RESPONSE TO NATIONAL TRUST WRITTEN REPRESENTATIONS

CONTENTS

TABLES

1 RESPONSE TO NATIONAL TRUST WRITTEN REPRESENTATIONS

1.1 Coastal Geomorphology

1.1.1 The following table is compiled of comments the **National Trust Deadline 3 Submissions** [REP3-070] with the Ref ID referring to the corresponding paragraph location within the document. "A" and "B" within the Ref ID refer to Appendix A (Sizewell C Coastal Defences Design Report [REP2-116]) and Appendix B (BEEMS Technical Report TR544 Rev 02 [REP2-115]).

1.1.2 Column 3 provides the SZC Co response.

Table 1.1: Response Table

Ref. ID	National Trust Comment	SZC Co. Response
6.1	The National Trust welcomes the submission of additional information provided by the applicant, specifically the Sizewell C Coastal Defences Design Report and the one dimensional modelling of the soft coastal defence. We have set out technical comments on these documents as Appendices to this document. (See page 9 of this document for Appendix A: National Trust technical comments on design details and plans for the Hard Coastal Defence Feature, page 15 for Appendix B – National Trust technical comments on the Sizewell C One dimensional modelling of the Soft Coastal Defence Feature (SCDF)).	n/a
6.2	The Trust have also reviewed a number of the other Written Representations made by other organisations is so far as they relate to coastal processes and geomorphology. We have set out some comments on these as an appendix to this document on page 33 (Appendix C – National Trust Comments on other parties Written Representations).	SZC Co. will provide a response at Deadline 7 as appropriate.
6.3	The Trust does not feel any of the work contained in the recently submitted documents referred to in 6.1 above answer or mitigate any of the concerns we set out previously in our Written Representation. We further note	The Environment Agency (EA) and East Suffolk Council (ESC) indicated at the ISH6 (Coastal Geomorphology) that they are both satisfied with the work up to date which proves the viability of the Soft Coastal Defence Feature (SCDF) up to 2099. The viability of

	the Environment Agency's view as set out in their Written Representation (p.3) that "The sustainability of the Hard and Soft Coastal Defence Features (HCDF and SCDF) has not been demonstrated, and insufficient evidence has been provided to allow the impact on geomorphology and coastal processes to be understood." We support this view and believe these issues need to be heard and discussed within the examination process.	the SCDF has been explored further in **BEEMS Technical Reports TR545** [REP3-048] and **TR544** [REP3-032] and will be extended into further modelling of the SCDF through the decommissioning phase to 2140. That is due for submission at Deadline 7.
7.1	The National Trust notes that Requirement 7A of the draft DCO refers to the Main Development Site Coastal Processes Monitoring and Mitigation Plan (CPMMP). This requirement states that construction of the hard and soft coastal defence must not commence until the CPMMP has been submitted to and approved by East Suffolk Council, following consultation with the relevant Statutory Nature Conservation Body, the Environment Agency and the Marine Management Organisation (MMO). The National Trust strongly believes that the extent of monitoring under the CPMMP should be determined at the examination stage and not left to a requirement. Our reasoning for this is set out in detail in our Written Representation but also in the Appendices to this document.	The Coastal Processes Monitoring and Mitigation Plan (**CPMMP**; [REP5-059]) will be in place and agreed before development. DCO Requirement 7A relates to approval and implementation of the CPMMP. This is also secured as Condition 17 on the Marine Licence. The CPMMP itself is the plan which outlines the monitoring (geographical extent, methods and frequency) and mitigation measures (recharge of SCDF, sediment by-passing or recycling) to mitigate any potential impacts of the project on coastal geomorphology receptors. A draft CPMMP was submitted as part of the January 2021 submission (**Volume 3, Appendix 2.15A** [AS-237]) Revision 2, taking cognisance of the most recent modelling work for the SCDF and MTF feedback, has been submitted at Deadline 5 [REP5-059]).
A.1	The National Trust notes the submission at Deadline 2 of the Sizewell C Coastal Defences Design	n/a

A.2	Whilst we welcome the submission of further information on the design of the HCDF we remain concerned (as set out in our written representation) that the examination is progressing without key information. Statements within the HCDF report highlight that certain matters remain under investigation and are the subject to further study. As such we are concerned that the approach adopted by the developer is impacting the ability of the Marine Technical Forum to consider the proposals and would request that sufficient time is provided to regulators and stakeholders who will be affected by the proposed HCDF and SCDF to review the detail of the final design. Our initial comments on the Coastal Defences Design report are set out below;	Designs sufficient for EIA have been used in the development. A Rochdale envelope approach is taken to the assessments. If design changes lead to impacts greater than those assessed, then re-assessment is required, as was the case for the BLFs and the HCDF/SCDF.
A.3	Advancing of the line of development seaward - As set out in our Written Representation we note that the provision of the coastal defence (HCDF and SCDF) advances the line of the development seaward. There seems little attention within the submitted design report to avoiding this advancement despite it being possible to limit the extent seawards by some degree through design.	The development of the SCDF is to retain the key aim of the SMP HtL (Hold the Line) by maintaining natural sediment drift across the frontage and not introducing a blockage. HtL is a policy concept referring to the need to protect the frontage, usually with exposed or embedded hard engineering. At Sizewell, the hard engineering (existing and proposed) is embedded. The mitigation to avoid exposure - the SCDF at SZC - would maintain the present-day beach and thereby seek to retain, but not advance, the shoreline..
A.4	The SCDF proposes to introduce pebbles and large cobbles to the environment and has plans for the on-going nourishment of larger sized material (skewing the sediment	The proposal is to construct the SCDF with sediment within the native size range. Both the potential for (slightly) coarser sediment recharges and cobble material as a core are forwarded as a

	size from what presently exists). As such it could be viewed at best as a semi-soft coastal defence. In practice, it will perform similarly to a hard and fixed coastal defence most of the time. The National Trust is concerned that both the HCDF and SCDF will form a permanent promontory on the coast for the duration of the development with the potential to interrupt the coastal processes and alter sediment transport directions.	potential solution for long term concerns but are not presented as definitive plans. In the matter of sediment transport direction, the mitigation proposed is to maintain the natural transport rather than alter it. The potential for SZC to become a permanent promontory has been considered in the modelling and reporting in both **BEEMS Technical Reports TR545 and TR544** ([REP3-048] and [REP3-032]). Under such circumstances, the SCDF erodes faster at its longshore extents and supplies additional sediment to the coast at a faster rate. The **CPMMP** [REP5-059] would also be used to test whether there were any deficits in longshore transport as a result of a protruding maintained shoreline (arising from natural erosion of the adjacent shores), and mitigate for such losses using the methods set out in **Volume 2, Chapter 20 of the ES** [APP-311].
A.5	The report introduces (firstly at Point 3.4.4 but also other places e.g. 3.7.15) that the design is only in outline and more detailed work is required to determine the profile; this and the need for other modelling work would seem to suggest the design is in early stages and it would have been anticipated to be more developed by this point in the process. If the toe level needs to be lowered (and retaining the relevant slope angle) then this can only mean further extension of the hard defence seawards; the maximum possible extent to seawards should be clarified for the HCDF (and including the use of cobbles if that is to be the	See our response to Ref#A.2 regarding the design suitable for assessment and the Rochdale envelope. The HCDF is predicted to remain a 'terrestrial' feature due to the mitigating effects of the SCDF placed and maintained between the HCDF and the sea. The viability of the SCDF has been explored further in **BEEMS Technical Reports TR545** [REP3-048] and **TR544** [REP3-032] and this will be extended in further work (to include matters pertaining to the HCDF toe location) which will be submitted at D7.

	case). It is apparent that the overlapping of the HCDF with the SZB defence lifts it further seawards than would otherwise be the case.	
A.6	When considering the minimisation of the eastwards extent, it is stated by the developer in para 3.9.5 (pdf page 25) that "It is also not considered feasible to relocate the entire SZC platform further west as this would further increase land take from Sizewell Marshes Site of Special Scientific Interest (SSSI) which would not be appropriate." This does recognise that impacts are made there already but it does not present any real evaluation of how the balance between where impacts might be felt and how they might be mitigated is addressed; it may be more feasible to mitigate the landward impacts elsewhere than to mitigate the direct loss of foreshore and upper beach and disturbance to natural processes and alteration of the sedimentary distribution of the coastal system? It is unclear why a sensitivity of such matters is not presented?	SZC Co. has sought both to minimise impacts on Sizewell Marshes SSSI and coastal processes and the optimised Temporary and Permanent Coastal Defence Feature Plans submitted at Deadline 5 [REP5-015] have reduced the seaward extent of the sea defences by up to 15m without any increase in permanent or temporary land-take from the SSSI.
A.7	The National Trust believes there also appears to be little effort to alter the HCDF design to achieve a more landward position of it, for example, on a cursory look there is around 30m from the crest to the landward toe of the HCDF which might be engaged in this design process; bearing in mind that this is presented as only an outline design it is unclear	A full justification of the seaward extent of the HCDF was provided at Deadline 2 (REP2-116). Updated plans demonstrating further detailed design, including recovery of 5m from the eastward extension along the length of the HCDF, paring back of the permanent BLF abutment to bring it in line with the main HCDF line and improvements to the temporary

	why landward slopes cannot be considered in detail to utilise all or some of this 30m space: it could be possible to have a vertical face to landwards (at the landward side of the crest) with a green wall facing and not have a slope at all; this might reduce the seawards extent by around 20m. Such considerations do not seem to have been made but should have been in even an outline design process if such environment consideration were within the design parameters.	defence at the northern end of the sea defences were provided at Deadline 5 [REP5-015]. An updated report to accompany the revised plans will be submitted at Deadline 7.
A.8	Figure 3-1 shows both the temporary sheetpile sea defence and the permanent HCDF, both are seawards of the shoreline thus forming a hard promontory on the coast. Within the HCDF there is also a shallow bay in the design along this frontage (the SZC frontage declared at around 750m in length) with promontories at each end; it is possible the shallow bay form aims to retain sediment between the created headlands which might be beneficial in reduction of losses of the SCDF sediments but these headlands are likely to be more disruptive to longshore sediment movement and so have a greater impact to the adjacent coastline (both north and south of it) and this is likely to become more pronounced in the long term (which is now extended to 2140) as a result of the fixed nature of the HCDF whilst the surrounding coastline is soft in nature.	Neither structure is seaward of the shoreline. There are no promontories at each end of the HCDF as there will be a continuous sedimentary frontage. If the maintained beach / SCDF becomes a promontory (which is not expected for several decades), modelling shows that it will supply additional sediment to the longshore transport system. The monitoring included in the **CPMMP** [REP5-059] is also designed to assess the potential for longshore sediment deficits and mitigation methods are set out in **Volume 2, Appendix 20A of the ES** [APP-312].

A.9	Table 3-4 summarises the changes made from the previous submission and shows a higher crest level (it is unclear the visual implications of this have been presented by the developer). It also shows a lower toe level (so the structure is further seawards than previously, apparently by around 8-10m).	n/a
A.10	Figure 2-3 shows an indicative beach profile, this will not be the reality (which will vary from this) so how will the toe stability be guaranteed?	The SCDF buffer will be defined in the **CPMMP** [REP5-059] to accommodate normal variability in the beach profile.
A.12	It is noted that the design life is for 120 years, to 2140. Previous assessments seem to cover a 97-year period for their impacts; the full lifespan of the development including its operation and decommissioning (whole life) would be applied to all assessments.	The viability of the SCDF has been explored further in **BEEMS Technical Reports TR545** [REP3-048] and **TR544** [REP3-032] and will be extended in further modelling of the SCDF through the decommissioning phase to 2140. This is due for submission at Deadline 7.
A.13	It is noted that the HCDF (2.1.1) is identified as “earthquake-resistant (seismic design)” it is unclear if this addressed only vibration or potential impacts on tidal waters as well?	Seismic qualification is a requirement of the external hazards component of the Nuclear Site Licence safety case. The assessment considers vibration. We presume the comment relating to ‘tidal waters’ refers to tsunami risk – this has been assessed and included in the design basis for the defences.
A.14	It is noted there is (2.2.3) “Up to 2m thickness of landscaping over the revetment on the seaward slope giving a maximum total height of +14.6m OD”; this would appear to have no structural or coastal defence integrity	A sufficient layer of substrate is provided in the design to give the structure a naturalistic appearance and support vegetation and habitat similar to Sizewell B’s defences.

	and so it is unclear why this thickness is required or could not be reduced to reduce the height and related impact of the structure?	
A.15	It is noted (2.2.3) the developer includes for "An adaptive sea defence height of +16.4m OD excluding landscaping, with a maximum height of +18.0m OD including landscaping." This is a significant increase in height compared to previous proposal and would have impacts to landscape and visual amenity if/when implemented; this should be evaluated as part of the impacts of the development.	It is confirmed that the adaptive design has been assessed.
A.16	When discussing the slope (3.9.9) on which to have vegetation (grass) it is untrue to say that motorised machinery can not cut >1:3 slopes; NT has such equipment bought on the open market for cutting banks of 1:2 slopes, however, having a steeper seawards slope may be undesirable for any runoff or runup/backwash processes.	Noted. SZC Co. is of the view that 1:3 slopes or lower are preferred to steeper slopes for ease of vegetation establishment and management.
A.17	It is noted that it is asserted (e.g.2.2.3) that the SCDF is stated here as including both pebbles (that is sediment between 4 and 64 mm) but in the SCDF report this is limited to 32mm to 64mm only) and cobbles (sediment between 64 and 256mm, in the SCDF indicated s towards the coarser end of the range, but not specified exactly).	The proposal is to construct the SCDF with sediment within the native size range. Both the potential for (slightly) coarser sediment recharges and cobble material as a core are described as a potential solution for long term concerns but are not presented as definitive plans - these fine elements of the mitigation will be

	The SCDF report has cobbles added as “Option B” without indication of preference; it should be clarified what the developer intends with regards the placement of pebbles and cobbles (and definitive size range) and why this is necessary.	discussed and agreed with the regulatory Marine Technical Forum (ESC, MMO, EA & NE). In the matter of sediment transport direction, the mitigation proposed is to maintain the natural transport rather than alter it.
A.18	In this report there are various references to shingle (for coastal locations this normally applies to sediment of 2mm to 200mm in size) and hence a wider grainsize distribution is introduced this includes in 3.7.1 and Figure 3-7 and A.4. There is reference inn 3.7.1 to this (shingle) being the upper beach. In other places (such as 3.9.12 with reference to forming ramps to the beach, 4.1.3 and 4.2.2 as fill between the SZC defences and SZB defences, and in 4.2.12 as dredged imported shingle. Clarity is needed over where the shingle material is sourced from (as this is identified as sediment of the upper beach) and/or how much shingle sized sediment will be imported.	Shingle will be sourced from suitable material won in site preparation works and any additional material required obtained from licensed extraction sites providing suitable graded material, as for widespread shingle beach works in south and south-east England.
A.19	There is also reference (3.9.12) to a “sheetpile abutment” rather than an open end span to the permanent BLF; this change could alter processes in the vicinity of that abutment and being (presumably) vertical will behave very differently to the sloped face that would otherwise have been presented; where are these impacts presented?	The BLF abutment is within the SCDF and hence no impacts are predicted to arise. Note that the HCDF protrusion at the permanent BLF (the 'BLF abutment') has been removed during detailed engineering (see response at A.7).

A.20	For the Adaptive Design (and indeed the HCDF in general) it appears that there is no intent to remove the whole structure even after decommissioning of SZC; it is unclear who then takes responsibility for maintaining and managing the structure or any risks and impacts arising from its decay?	Following consultation with ESC, SZC Co have agreed to the default position should be that the HCDF is removed at the end of decommissioning, however this will be subject to an assessment at that time. This is confirmed in the CPMMP. Decommissioning of the Sizewell C site including the HCDF will be informed by specific EIA in the future (as required by the Nuclear Reactors (Environmental Impact Assessment for Decommissioning) Regulations 1999). That EIA will need to assess likely environmental effects at that time taking due consideration of the environment, materials, and technology at the time. SZC Co. cannot pre-judge what that assessment would be at this time. Post-decommissioning HCDF options will be determined toward the end of decommissioning, as set out in the **CPMMP** [REP5-059].
A.21	In the Adaptive design (para 3.8.1 pdf page 22) it is commented that 10% was added to wave heights and periods; it is unclear how this has been calculated, is it simply multiplying a calculated wave height or period by 1.1? If this is the case it would seem an approach that does not consider the sensitivity of the combination of wave height and periods that might exist and how such might impact factors such as wave steepness; this should be clarified. It is best practice for adaptation of design to involve stakeholders.	The 10% climate change is applied by simply multiplying wave height and period by 1.1. It should be noted that these are spectral parameters and the design calculations consider a range of wave periods, and therefore the whole range of wave steepness in order to determine the critical design conditions according to the design formula being used.

A.22	It is noted (4.3.2) that the core and foundations for the adaptive HCDF would all be placed in constructing the permanent HCDF; and not require any further intrusive work; this should be explicitly conditioned	This is a matter for the ExA to consider.
A.23	The geology of the placed rock may be relevant in respect of its visual appearance (aside from the impact of the structure itself), for example, should it contain mica it could present an unnatural and distracting sparkling appearance or if dark in nature this could be a highly distinct and different type of sediment than that occurring naturally. The visual appearance should be presented for assessment.	The rock armour would be covered with substrate and landscaped so would not be visible.
A.24	It is mentioned that rock armour and under rock would be imported; it should be clarified if this is intended by land or sea and where any stockpiling might take place and how long this may remain prior to completion of construction of the HCDF	All such activities would fall within the proposed construction parameters and HGV/vessel limits included in the application.
A.25	The Trust is pleased to see in Table 3-1 that RCP8.5 95th percentile has been used to consider future climate change and recognises that potential risk level. The assumption for a reasonably foreseeable situation that offshore banks maintain the existing protection should be reconsidered as there have been historic examples of the banks lowering and erosion rates increasing (so it is foreseeable within the existing envelopes); this could cause beyond the 20m of	A primary driver for future coastal change is sea level rise. This will allow wave energy to erode sediments from higher up on the GSB's beaches and cliffs. The local UKCP18 climate change predictions for the Sizewell area show that wave energy is predicted to remain similar or decrease (see **Section 2.4.2, Volume 2, Appendix 20A of the ES** [APP-312]). The impact of bank lowering on erosion rates is dependent on many factors. **Volume 2, Appendix 20A of the ES** [APP-311] has considered

	long term erosion identified. There is also no assumption about the nearshore bars that can modify their form and hence degree of protection to the shoreline. For the storminess there is a measure of assumed increase in storminess, but this does not reflect frequency of storms which,where more frequent, will alter the processes and increase dynamics.	the impact of SZC marine elements on coastal processes and shown these to be minor in magnitude and assessed likely effects as localised and not significant. Natural changes in regional conditions (including 'storminess') will not alter the scale of these impacts. The principal aim of the proposals within the CPMMP is to ensure that residual SZC impacts do not propagate to regional scale effects.
A.26	Coastal path – The Trust note that Figure 3-1 shows the coastal path but it is unclear where the coastal path will move to should the “adaptive” measures be applied; in that case it would be to address higher sea levels and so it is unclear this path position would be sustainable in such a circumstance?	A response will be provided at Deadline 7.
A.27	Being on the seaward face of the HCDF (permanent) it is unclear how accessible the coastal path would be under storm conditions allowing for any spray effects etc; what alternative would there be to landwards? Also, it is noted (Figure 3-5) the coastal path sits 1.2m below the crest (located to seawards of the path) and hence as configured would obscure the view of the sea and lower beach (at low tide) for some.	The scenario described is no different to the case at present without Sizewell C, nor the adjacent frontages.
A.28	The reference to ramps (3.9.12) for diverting the coastal path are unclear; is the intention to divert people along the seawards toe of the SCDF when the developer has	Inland diversions of the Coast Path may be necessary for short periods during the construction phase. However, SZC Co. has sought to minimise temporary closures of PRoW and will continue

	deliveries being made? It is unclear what sort of window of access this would provide now or in the future.	to do so throughout the pre-construction and construction phases. Further detailed design work included in the Additional Submission in January 2021 has identified that PRoW E-363/021/0 and the Coast Path would be kept open at all times except in rare circumstances where it is considered unsafe to do so, as noted in paragraphs 2.10.38, 2.10.40 and 2.10.54 of **Volume 1, Chapter** 2 of the **ES Addendum** [AS-181].
A.29	Temporary defence - The developer states (3.2.1) "A temporary sea defence is proposed to protect the existing SZB nuclear power station and the proposed Sizewell C Main Construction Area (MCA) from coastal flooding during the construction phase.". It is shown in appendix A3 that these 'temporary piles' are not removed but become part of the permanent defence. It is unclear if this is integral to the permanent defence design or simply convenience and cost driven? If they serve no functional purpose they should be removed if they are only temporary during construction and at least the metal recycled. This should be made clear so that the implications of this impact can be considered and addressed as part of the environmental impacts of the development	The temporary sheetpiled defence would be removed or cut down during construction of the permanent sea defence. Any construction waste arising from this activity will be managed in accordance with the Environmental Statement – see Volume 2 Main Development Site Chapter 8 Conventional Waste and Material Resources [APP-193].
A.30	Figure 3-2 and Appendix A.2 show cross section of the Temporary HCDF that appears to be in place for around 12 years (during construction of SZC). There is no indication	The sand berm will remain in place - the risk of the beach being lost entirely during construction is extremely low (and such loss would indicate wholesale destructive change on the coast). See

	of the distance in the 'indicative beach' between predicted Mean High Water Spring tide and the dune crest nor the Highest Astronomical tide shown (which is already predicted to arise) nor indication of how a surge tide level might sit with this profile. As the diagram is showing a dune crest it is assumed that this sandy feature remains in place until buried beneath revetment or cobbles/pebbles when further coastal defence work happens – this should be confirmed. It is unclear what the risk of removal (e.g. by natural processes) of this beach in the intervening period could be; the piling is vertical and this would set up reflection (if exposed) that would interfere with the ability of the beach to naturally re-build - has this eventuality been considered and assessments made of the requirement for additional material to replace that lost in such a way? It is identified (3.2.4) that “It may be possible to reduce the northern extent…” of the piling. The configuration could be important as creating this high vertical wall on a soft coastline will also have visual consequences from the seawards side (seascape) or elevated positions and that should be represented by montage. There is also no indication of lighting in this area or other devices such as for emergency flood warning that might be employed (bearing in mind the excavation is below the level of the defences in the MCA) or signage	also the optimised Temporary and Permanent Coastal Defence Feature Plans submitted at Deadline 5 [REP5-015]. These plans show that a temporary sheet pile barrier is no longer proposed around the northern mound in favour of an optimised construction sequence for the mound.

A.31	It is clarified (4.2.1) that the permanent HCDF will be constructed towards then end of SZC construction phase; this suggest the vertical steel sheet pile wall will be in place for more than a decade. It is unclear if the developer believes this sheet piling will be exposed to any tidal action/wave run up in this period - bearing in mind there is no SCDF until the hard HCDF is in place, this would mean any reflection from this vertical wall would be to the beach fronting and around the structure; there is no information presented on these impacts.	The sheet piling is set back a considerable distance from MHWS and the beach in front would not be affected by construction so the piling would not be exposed to marine processes - the risk of the beach being lost entirely during construction is extremely low (and such loss would indicate wholesale destructive change on the coast).
A.32	In other places including drawings of the permanent HCDF it shows the steel piled wall remaining within the structure but in 4.2.4 it is stated that "As the Permanent Sea Defence is constructed, the Temporary Sea Defences would be removed or cut down to permit the construction of Permanent Sea Defence." There should be clarity if they are removed, cut down, or form an integral part of the permanent defence.	See response at A.29
A.33	The developer states (4.2.9) "With the erosion protection in place, the Northern Mound will provide effective protection to the MCA excavation. The sheet pile wall would be breached to allow access to construct the land-side piles for the Permanent BLF. At this stage, the sheet pile wall would still be the primary defence against attack/	See response at A.30

	degradation by wave energy in severe storm conditions." This sequencing is unclear; for example, if the sheet pile wall is breached for construction purposes how can it still provide a primary defence?	
A.35	Further comments on the SCDF have been made against the SCDF modelling report. The text refers to Figure 3-3 and Appendix A3 but the relationship to beach profiles is not clear on those; does the text mean to refer to Figure 3-7? Also, section a) et seq is referred to but it is unclear where that is? The Figure 3-7 shown an 'indicative' beach profile, it is unclear if the volumes of sediment required are calculated in relation to this or not? It also highlights that the profile could be different to this at the time of placement of SCDF materials and thus could involve higher or lower volumes and thus a greater or lesser amount of coarser material introduced: There is not a upper and lower bound for such volume presented. Is the reference to numerical modelling (e.g. 3.4.4) the 1D approach that has been reported or has some other modelling results not been presented here?	Calculated volumes of sediment are based on an indicative profile but 'requirements' are based on eroded volumes during storm events. The volume requirements of the SCDF has been explored further in **BEEMS Technical Reports TR545** [REP3-048] and **TR544** [REP3-032] and this will be extended in further modelling work up to D7. The required volume of sediment recharge is presented as being determined by volumetric replacement of losses rather than extant beach slope at the time of recharge.
A.36	Whilst the developer states (3.7.6) that "The introduction of beach replenishment material (pebbles and cobbles) on the shoreface and backshore (beach crest) as proposed would ensure that a protective beach is maintained	Cobbles are suggested as a potential measure to increase beach stability, in order to avoid HCDF exposure, as they are shown by modelling (80 mm diameter fine cobbles) and in the scientific literature to be very stable and unlikely to be eroded (**BEEMS**

	seaward of the HCDF" as this includes cobbles that assumes that all the pebble material would have been removed exposing the cobbles that lie immediately adjacent to the HCDF and as it is assumed the cobbles could move then it is unclear how such protection is envisaged to remain?	**Technical Report TR545** [REP3-048]). That is, an exposed cobble layer would move and absorb energy in the way that (cobble) beaches do, but the degree of profile adjustment and loss of sediment would be very low.
A.37	The design of the SCDF should consider the proposition that the interstitial spaces of pebbles and cobbles could be in-filled prior to exposure of the sediments by storm action and thus would behave very differently than the originally placed material. Although not provided explicitly (which it should be), the drawings for the SCDF suggest it could be around 35 to 45 m wide, of less mobile material than most native sediment and at a steeper angle of repose; this presents a protrusion or advance of the shoreline into the existing physical processes and would likely interrupt those processes to some extent (of unknown magnitude and direction under different tidal and wave conditions and water levels tidally, seasonally and accounting for future sea level rise and climate change).	Interstitial infill will occur, very gradually, but this would (if sufficient sand volume were to cause any change at all) move the behaviour of the emplaced sediment closer to that of the active beach face (and mostly occur across the intertidal elevations - sand content naturally falls to very low levels in the supra-tidal). The SCDF is designed to work with natural processes such that, if storm waters impinge upon it, the sediment mixes normally with that of the lower beach and forms a natural profile (reflecting whatever present or future conditions pertain), exactly as any other supra-tidal sediment does.
A.38	The uncertainty around recharge and the statement (3.7.15) that "These matters are currently under investigation and subject to further study." does not give confidence that they have been thought through: It is	The viability of the SCDF has been explored and proven in **BEEMS Technical Reports TR545** [REP3-048] and **TR544** [REP3-032] and this will be extended in further work to be issued at Deadline 7.

	unclear why they have not been fully studied to allow proper assessment of them as they can fundamentally alter the coastal processes operating on the coast here, particularly when consider the long term cumulative consequences.	
A.39	The developer states (4.2.12) the following which raises a number of questions (in italics) "Following construction of HCDF, the SCDF profile would be formed using dredged imported shingle material <the material identified is pebbles and cobbles not shingle, or is this something different ?> and any suitable site won material <it is unclear what this means?>. A trailer suction hopper dredger would dredge material from a licenced offshore site, and then moor off SZC. The shingle would then be pumped ashore using a pipeline <it is unclear if this is a floating or sunk pipeline? and if this is appropriate for cobble sized material ?> and moved into the profile < this suggests there is a profile rather than a straight slope, what is the profile?> using bulldozers.	Shingle is a generic term used in Britain to describe mixtures of sand and gravel (specifically pebbles and cobbles) sized sediments. Shingle will be sourced from suitable material won in site preparation works and any additional material required obtained from licensed sites providing suitable graded material, as for present east coast shingle beach works.
B1.1	The SCDF sediment placement referred to in the Executive Summary will involve different vessels and movements to those associated with the temporary and permanent Beach Landing Facilities (which as we highlighted in our Written Representation have yet to be assessed by the developer	Impacts from vessels, dredging and mooring were carried out in the **Volume 2, Chapter 20 of the ES** [APP-311] and identified as negligible (albeit these assessments were not for the specific activity of SCDF emplacement, but the assessments would remain

	with regards to the impacts of ship movements). For the initial SCDF placement there could be anywhere in the region of 7 to 60 vessel movements (to and from an as yet undefined mooring location) dependent on the Trailer Suction Hopper Dredger (TSHD) sizing. The impact of these ship movements on the seabed and geomorphological features is not assessed. In addition, the vessel sizing is relevant to the assessment of impact to the bed or the need for modification of the nearshore bed features (banks and bars). There would also be the need to evaluate the impact of the dredger at mooring as well as from the pipeline type and route. The on-going vessel movements for future recharge campaigns would also need to be assessed including any cumulative or in combination impacts.	valid as the same sorts of vessels would be used). See also **Outline Vessel Management Plan V01** submitted at Deadline 6.
B1.2	We note the developer claims in the Executive Summary that the sedimentary mass placed is designed 'to avoid disruptions to longshore transport' (see pdf page 9); this ignores the disruption caused by advancing the line of the coast by placement of the sediment (and the associated HCDF structure). It is assumed by the developer that any placed sediment feeds only to the beaches adjacent to the development as a 'recharge' of sediment to those beaches yet there is no design related to the requirement for recharge as a consequence of the impacts of the	The SCDF would maintain the present-day shoreline and future beach recharge would restore it to that same location. Recharge would be conducted as outlined to restore the mitigation following natural change, not as a consequence of the development. The requirement for mitigation is to avoid adverse impacts that would otherwise arise from an exposed HCDF (namely disruption to longshore sediment transport). So, it does indeed mitigate against the impact (to avoid it, so that it is not caused). The consequence of the sediment input to the shoreline has been considered i.e., an increase in shingle volume within the Sizewell sub-bay and an

	development. In short either this is needed as a mitigation against the impact caused or it is an addition of material to the environment that is not required and so the impact of that should be evaluated. The focus of the developer's approach (as set out in our Written Representation) is to SZC frontage and the shoreline and beach processes rather than including the subtidal and geomorphic features such as bars and banks and interplay there. As the (SCDF) sediment will be replaced once it has fed out (been transported away from the headland formed by the SCDF) the recharge will be an on-going artificial import of sediment to this coastline for many decades to come. There is little assessment of the impact that this will have over the period to 2140 (which is longer than in previous documents) referred to for the development and should include the impacts of re-orientation of the shoreline as a result of the development, the impact caused by building seawards, and how this will disrupt the longshore transport of sediment along beaches, foreshore and sub tidally. In effect this is creating a ness on this coastline and those have well known processes that divert sediments offshore.	increase in beach shingle volumes adjacent to SZC, reducing the rate of increase in the shoreline angle (driven by the deepening of the bay between the constraints of the Minsmere sluice and SZB outfalls). The release of SCDF sediments and the effect of a different shoreline orientation due to natural recession of adjacent beaches is examined in **BEEMS Technical Report TR545** [REP3-048]. Small protrusions on the coast have limited impacts in terms of diverting sediment offshore - for example, the Minsmere Sluice outfall pipe does significantly disrupt the transport of beach shingle (specifically pebbles), but it does not divert sediment into the offshore. As a consequence, the sandy longshore bars simply curve around the structure, resulting in no disruption to longshore sand supply.
B1.3	The design recognises that sediment will be liberated from the sacrificial component of the beach, this is the most seawards component of the SCDF and hence will liberate to the natural sediment fronting it (especially in draw-down	Shingle drawn down from the present natural beach is also larger than the sand fraction of the lower beach and subtidal so there is no alteration of present process. We concur with the comment, in that the behaviour of the sediment will be that of a mixed beach -

	from storms). The sediment it will mix with immediately is considerably finer in size than that placed (the developer has only used sand sized sediments in previous modelling of this lower zone and subtidal area); the behaviour of any liberated sediment will thus not be the same as placing a unimodal narrow sized range of pebble sediment but will be introduced to sand and hence behave as a mixed sand and pebble sediment as soon as liberated. This will alter its behaviour and could include transport to locations that the upper beach material does not naturally reach (the existing beaches are more landward and have the added dissipation of waves before being reached whereas the SCDF is deliberately constructed seawards of that and so to a (comparatively) more energetic environment.	but, since this is the natural state, this does not represent an alteration of the present behaviour. Modelling presented in **BEEMS Technical Report TR545** [REP3-048] does consider both of the sediment size modes (sand and pebbles). It also considers more energetic environments through both a protruding SCDF (caused by future natural recession of adjacent shorelines) and severe storms. The SCDF would maintain the present-day beach and would not be constructed seaward of that.
B1.4	It is of concern that the design of the buffer (and option B of placing cobbles along the HCDF) is more akin to hard engineering than soft; the intention is for the buffer (and/or cobbles) to remain in situ and not be eroded away; the recharge of lost material to seawards happening in advance of this being eroded. In effect that means this additional width (advance offshore) is conceptually part of the hard defence and not a soft defence. The introduction of a cobble layer suggest the designer is, however, not confident that this buffer will work (remain in situ) and hence the toe of the HCDF could be exposed so to counter	It is incorrect to say that "the design of the buffer (and option B of placing cobbles along the HCDF) is more akin to hard engineering than soft". Soft approaches use sediment in the size ranges commonly found on beaches to form or maintain a beach, dune or shingle ridge system. The buffer is defined as a mitigation trigger to prevent exposure of the HCDF. Since it is the same material as the sacrificial volume, it remains a soft feature capable of adapting and modifying in response to natural forcing and is not dynamically a conceptual part of the HCDF. The optional cobble layer (modelled for 80 mm diameter particles) is also soft as it would behave as a cobble beach would, showing a degree of mobility during storms,

	that much larger sediment is placed like rip-rap to the toe. The cobbles are not intended to be mobile, but it seemsthe designer recognises forces could be such that they might. In the presented design, the assumption is the HCDF does not become exposed as there is such a massive placement of volume advancing the shoreline seawards. The fixed nature of this created headland will deflect the normally north-south running longshore transport processes and so it is difficult to see how this is not disrupting longshore processes	but as shown in the scientific literature and SCDF modelling, much less than that of a pebble beach (both in terms of profile change and volumetric loss - see **BEEMS Technical Reports TR544** [REP3-032] and **TR545** [REP3-048]). The purpose of the cobble layer, if used, would be to reduce further the risk of HCDF exposure, and the impacts that would cause. The cobble core of the SCDF is indeed proposed as a 'failsafe' counter measure to ensure that the (finite) risk of exposure of the HCDF does not lead to lowering of the beach due to scour and so facilitates ongoing beach restoration and management. **BEEMS Technical Reports TR544** [REP3-032] and **TR545** [REP3-048] already assess the extent to which an SCDF promontory will affect longshore transport - however, mitigation (bypassing, recycling, further recharge) is also proposed to ensure that there is no significant deficit beyond the immediate area of impact around SZC.
B1.5	It is unclear why a fundamental matter of design such as whether to place large cobbles along the toe of the HCDF has not yet been concluded. It is stated in the Executive Summary as being considered.	There is no proposal to use large cobbles - the proposal in **BEEMS Technical Report TR544** [REP3-032] is the use of fine cobbles, slightly larger than the native size distribution. This comment is posed as if the artificial beach sediments were part of the hard engineering design, which they are not. It is acknowledged that the SCDF does serve a dual purpose of protecting the HCDF toe and the longshore transport corridor.
B1.6	The Trust notes the sediment to be placed is coarse (only 3.2 to 6.4cm diameter) and includes no fines so will form a	The SCDF sediment will be within the native size range and include a low proportion of sand, as is typical of supra-tidal beach

	steeper angle of repose (once worked by the tides) than the native material. This is likely to alter the visual appearance of the coast compared to the present SZC frontage beach; not only will it be located seawards of it by tens of meters but also be steeper in angle. Assuming some of the SCDF material erodes away and does arrive on adjacent beaches, it will be altering the sediment distribution by making it proportionately coarser than present and hence also altering the properties of those beaches. There does not appear to be any recognition or assessment of these changes to geomorphology.	sediment at the site. In comment B1.3 it was recognised that sediment drawn down from the SCDF will be mixed with the natural beach material and hence it will behave similarly. Future recharge events will be reshaped continually with sand admixture from along- and cross-shore transport and continue to reshape with every natural change in forcing. The SCDF will be placed at a 'typical' angle (**BEEMS Technical Report TR544** [REP3-032] illustrated the SCDF with an 8.3º slope, the mean of the observed 6-12º range).
B1.7	The assessment does not appear to consider anything larger than a 1:12 storm event (footnote 1 of the Executive Summary). Bearing in mind this will be in place for possibly 120 years (as the developer has already identified that it will do nothing in the last ten irrespective of how uncertainty in coastal change pans out in the intervening years) this would seem unnecessarily limited. It may be the case that one larger event exercises considerably more work that 2 or three 1:12 sized events so it is unclear why this has not been done. Notwithstanding this, the developer makes sever claims that the design is 'conservative' but if the assessment were assumed correct then it is unclear how it is justified to place 4 times the material required, causing greater impacts at both the	The viability of the SCDF has been explored further in **BEEMS Technical Reports TR545** [REP3-048] and **TR544** [REP3-032], including a 1:107 year wave power event and 1:20 year design storms from NE and SE directions (such storms are more severe than the 1:20 instantaneous condition, because they apply the one in twenty year wave height statistic continuously across 13 hours). The volume of material required represents a balance between function, resilience against the risk of low frequency high magnitude events, and longevity (minimising the frequency of recharge interventions). This is in part a calculable physical balance and numerical data is presented in **TR545** [REP3-048] and **TR544** [REP3-032]. The statement that "the developer has already identified that it will do nothing in the last ten [years]" is incorrect. The CPMMP [REP5-059] and beach mitigation would run until the

	source and placement sites and leading to a more pronounced promontory on the coast that is actually required. There seems to be no sensitivity analysis just coarse measures and hence we believe this is not suitable to determine the genuine impacts that this activity of the development will have on the coast. The additional work that is required should be presented within the DCO process and not allowed to drift into isolated assessment through other mechanisms at a later date; this is particularly relevant to long term change and the interruption to the existing processes that this SCDF will pose to the coast (on a wider frontage than the immediate SZC one and those adjacent).	end of decommissioning, unless otherwise determined as a results of assessments regarding the HCDF, which are expected in the last ten years of decommissioning, as set out in the CPMMP.
B1.8	The Trust notes and welcomes the developer's inclusion in the report of the RCP 8.5 95th percentile for predicted sea level rise; it is also noted this has not appeared in previous assessments where it is equally relevant. It is unclear how the developer can assert that this scenario (in a range of scenarios identified by UKCIP) is 'very unlikely'; and hence more or less likely than any other scenario modelled in a range presented. The support for their ('very unlikely') statement is not presented although it has been used and so included to the design process to present the worst	Reference is made to both RCP4.5 and RCP8.5 in BEEMS Technical Report TR544 Rev 1 [REP2-115]. RCP8.5 is an extreme climate change pathway used appropriately for matters such as flood risk, engineering design and safety case. The RCP4.5 95th percentile for SLR has been used throughout the assessment process for coastal geomorphology impact modelling as well as for establishing the viability of the SCDF. RCP4.5 is the intermediate representative concentrations pathway used in UKCP18, alongside the lower RCP2.6 and extreme RCP8.5. The climate change scenario selected should be proportionate to the risk level involved – in this case the assessment of impacts to

	case for sea level rise. The Trust agrees the worst case for sea level rise is appropriate.	coastal geomorphology. RCP4.5 was selected to consider the impacts of the station on coastal geomorphology because: • Coastal geomorphology will respond to the actual level of sea level rise - choosing an RCP that is too high or too low will increase errors and uncertainty. Therefore, a plausible case was adopted and is considered appropriate. • RCP4.5 is an intermediate scenario that is considered to be more extreme than the current trajectory (including current policies). It was therefore selected as a plausible case, suitable for consideration of the impacts of Sizewell C on coastal geomorphology. Under current and pledged policies, the RCP trajectory is under the RCP4.5 curve (Reference 1).
B1.9	The applicant makes reference in the Executive Summary (see pdf page 10) to the Southern North Sea licensed aggregate sites providing a nearby source of suitable sediment (pebble sizes) for the SCDF once local supplies from HCDF excavation have been exhausted. However, in earlier documents the developer referred to using material from general excavation related to the main construction site. The Trust would ask that the source of any material that would be placed to the SCDF be clearly stated in	There is no change to plans for sourcing material for the SCDF. Boreholes have shown that the HCDF excavations area contains pebble sized sediments, which would be harvested and used for the SCDF ahead of any material from licensed extraction sites. DML Condition 41 requires a detailed method statement to be provided and approved by the MMO.

	regards of any excavated material from within the development site. Also, can it be clarified what processing of sediment would be undertaken (if excavated including in the HCDF footprint) on site to attain the specification stated in the design with regards to pebble sized sediment only being placed.	
B1.10	The Executive Summary seems to ignore other statements made by the developer that there is little change happening on this coast. It is noted that the design presents a relatively large volume related to net rates of drift for example and also ignores the repeat nature of the placement that means, cumulatively there would seem to be over 1.3Mm3 of sediment placed (including the initial sediment placement). This is more comparable to the volumes for other one-off placements that are referenced, and the cumulative affects should not be ignored in this manner. The affects are particularly relevant if restricted to only pebble sized sediment that is intended to be less mobile. If restricted to only the pebble sized sediment it will still be mobile (hence requiring recharge) but introduce a higher percentage of coarser material to the native sediments. This may be less mobile when it arrives at the nearshore bed compared to the adjacent beaches; this warrants more than 1D modelling to assess the source, pathways, and sinks of this sediment and accounting for	The sediment volume of the SCDF has been explored further in **BEEMS Technical Reports TR545** [REP3-048] and **TR544** [REP3-032] and an estimated worst case operational phase requirement of 270,000m^3 presented (a conservative estimate likely to exceed the true requirement). These reports also present the results of 2D modelling. The principal aim of the proposals within the **CPMMP** [REP5-059] is to ensure that residual SZC impacts do not propagate to regional scale effects. The introduction of a restocked supply of pebbles via the SCDF would only affect local beaches, due to their lower mobility and the nature of natural pebble movement within the system. If pebbles accumulate in such areas, they will counter natural shoreline recession due to sea level rise and potentially be preferentially re-worked to widen the supra-tidal - this was assessed in the ES Addendum as having the potential to re-instate a higher quality annual vegetated drift line habitat and provide potential for nesting little terns

	their mixing (once mobilised) with the finer native sediment so that carefully evaluation of how features such as nearshore banks and bars as well as beach accumulations over the long term will occur. The Trust would like to ensure that this assessment is undertaken in full and that the impacts of the developer's approach can be fully considered as part of the examination process.	
B1.11	There seem some inconsistencies in the total volume envisaged for the initial placement; in the Executive Summary 270,550m3 and 203,250m3 are referred to and elsewhere (e.g., Section 1. Introduction) c. 200,000 is referred to; this is around a 35% difference in volume and makes following statements on volumes and relevance overly complicated.	The sediment volume of the SCDF has been explored further in **BEEMS Technical Reports TR545** [REP3-048] and **TR544** [REP3-032] and an estimated worst case operational phase requirement of 270,550m3 presented (a conservative estimate likely to exceed the true requirement). Other values represent alternative estimates obtained by alternative methods defined within **BEEMS Technical Report TR544** [REP3-032] (not defined as worst case, as lower).
B1.12	The developer identifies in the Executive Summary that the interval of recharge '…will not be constant…' but nor can the total amount be assumed to be correct as there remains uncertainty in the future. It is possible that sequences of events could deplete (lead to recharge) then deplete again in relatively close time periods and this will thus introduce higher volumes in such periods than are being presented here (and potentially overall). In a similar vein much less could be required for recharge purposes	The viability of the SCDF has been explored further in **BEEMS Technical Reports TR545** [REP3-048] and **TR544** [REP3-032]. The stochastic nature of erosive events is recognised in presenting representative volume and recharge interval indications. Furthermore, whilst such sequences can and do occur (and we have taken this into account in the modelling using the Beast from the East triple storm sequence), UKCP18 suggests a decreasing wave climate, so such events are not expected to become more prevalent. The principal aim of the proposals within the **CPMMP**

	but this would not remove the interference of coastal processes resulting from the presence of the promontory created by the HCDF/SCDF. How such impacts affect the environment and the geomorphological features that run along this coast and nearshore area all need assessment but are recognised as uncertain. The Trust believes this again supports the need for monitoring along the extent of those features such as nearshore bars. Monitoring should not just occur within the area where coarser sediment may accumulate but also along the coast as the features may be altered or function differently as a result of these interventions. Whilst the Trust agrees that this uncertainty can be addressed by monitoring the developer has so far steadfastly refused to recognise and take responsibility for the possible impacts that can arise from the development (including the HCDF, SCDF, Temporary BLF, Permanent BLF, intakes outfalls and mooring points) that will all interact in a combined way to alter the processes that presently operate.	[REP5-059] is to ensure that residual SZC impacts do not propagate to regional scale effects. Monitoring is specified which is designed to assess any potential propagation of effects outward from the localised impacts. In addition, the CPMMP sets out an approach for an adaptive environmental assessment and management plan. This will allow for timely changes to the monitoring plan and improve the prediction modelling. Analysis and interpretation of results will then inform an updated sampling strategy, hence creating a robust environmental assessment and management plan which includes adaptive monitoring and mitigation plans to respond appropriately. The CPMMP includes plans to monitor the longshore bars. The Applicant is of the view that it has followed the precautionary approach. The extents set out in the **CPMMP** [REP5-059]) are always larger than the predicted impacts, to allow for uncertainty. If the impact footprint exceeds the monitored area, the spatial extent will be adjusted accordingly (**CG.1.3 response to ExA at D2** [REP2-100]). That is, the CPMMP will take an adaptive approach to monitoring. Such changes would be secured through MTF consultation and require approval from the approving authority (ESC and/or the MMO). Preparation and compliance with the CPMMP is a requirement on the DCO (Requirement 7A) and a Condition on the Marine Licence (Condition 17); see the latest version of the draft DCO (**Doc Ref. 3.1(C**) [REP5-027]). The CPMMP is specifically maintained as a

		'live' document that will require review and update as required to reflect prevailing conditions or perceived impacts at the time.
B1.13	It is identified in the Executive Summary that more recharge may be necessary in proximity to the permanent BLF yet there is no explanation as to cause and effect here. We note it is identified by the applicant (in the BLF reporting) that the BLFs have no impact to sediment transport processes due their open and permeable (to sediment) structure.	As identified in the **BEEMS Technical Report TR544** [REP3-032], the increased recharge frequency at the BLF is due to the narrower beach and the higher rate of natural shoreline retreat (the lower sediment volume meaning a lesser sacrificial volume, depleted faster) and not a consequence of any BLF impact on transport process (which itself has been assessed in **Section 2.15, Volume 1, Chapter 2 of the ES Addendum** [AS-181]) as insignificant). As noted at A.7, a recent design revision has removed the BLF abutment feature in the permanent HCDF design, which will increase the beach volumes in this area. These volumetric increases will be accounted for in the update of **BEEMS Technical Report TR544** [REP3-032] due at Deadline 7.
B1.14	The developer states their report "…indicate that the SCDF is viable for at least the operation phase of the station" but again there is inconsistency in what length of time the operational phase is. We note the design details and plans for the Hard Coastal Defence Feature (HCDF) state in para 2.2.1 (pdf page 9, link to document) that 'The design life of the structure is 110 years (up to 2140 – extended to accommodate change in spent fuel storage strategy).' As previous documents have indicated different timelines	The viability of the SCDF has been explored further in **BEEMS Technical Reports TR545** [REP3-048] and **TR544** [REP3-032]. Viability has been assessed to the projected 2099 SLR, extending well into the decommissioning phase and the period to 2140 will be assessed in modelling work and the results issued at Deadline 7. 2140 is the specified timeline.

	clarity is needed on the timespan associated with the SCDF	
B1.15	Whatever timeframe is meant, repeat recharges are likely to become more frequent under future sea level rise scenarios (unless the recharge is altering the conditions generally) but it may appear viable (sustainable) to do. There is no indication of what situation (should it arise in the future) would make the proposed approach unviable and what course of action might be required in that eventuality (aside from option B to have cobbles along the HCDF that could be exposed if the 'viable' SCDF buffer and sacrificial pebble beach approach were to fail).	The viability of the SCDF has been explored further in **BEEMS Technical Reports TR545** [REP3-048] and **TR544** [REP3-032]. Viability has been assessed to the projected 2099 SLR, extending well into the decommissioning phase and the period to 2140 will be assessed in modelling work and the results issued at D7. **Volume 20, Chapter 20** of the **ES** [APP-311]) and the **CPMMP** [REP5-059] contain methods to quantify any disruptions to sediment supply were the HCDF to be temporarily exposed - that is were a significant deficit to occur, this would be replaced using beach recharge, recycling or bypassing, and the SCDF reinstated.
B1.16	that the applicant views the SCDF as set out in the report (Option A and/or B) can be adapted easily in the future if needed. The ability to alter management practice can be applied but this does not account for uncertainties in impacts to the physical processes and geomorphology of the beach and nearshore zone and any interaction to offshore bank system; particularly over the long term and over spatial scales larger than in close proximity to the immediate SZC frontage. There is not a mechanism presented in the report to re-assess impacts, to monitor in advance such impacts that might occur and can plausibly affect the NT frontage. It should be noted that the beach	The principal aim of the proposals within the **CPMMP** [REP5-059] is to ensure that residual SZC impacts do not propagate to regional scale effects. Monitoring is specified which allows for any potential propagation of effects outward from the localised impacts can be recognised and the adaptive monitoring and mitigation plans implemented to respond appropriately. There was no evidence for a pathway to impact coastal geomorphology at these distant locations (including the National Trust frontage), and therefore SZC monitoring and mitigation should not be required there. This is because: a. Sizewell C activities have minor and localised impacts to sediment transport (typically up to 100 – 200 m). And were impacts to persist and grow, they would radiate out from the activity

	and nearshore system cannot be considered strictly cellularised but is a continuous system where one part can alter another. Given the uncertainty and lack of clarity on the approach to be applied over a period (potentially) to 2140 it is not unreasonable that the beach, cliff and subtidal area fronting the NT property is monitored to allow assessment of coastal change in the context of the development; if this is not applied at the outset the ability to retrospectively garner such data will be limited and so would warrant a precautionary approach to be taken to any of the impacts of the development.	source. This means that they would travel slowly and within the confines of monitored extents and the GSB (as explained in 4.3); b. There is no SZC structure that reduces bulk (net) transport to the south (excluding an exposed HCDF); c. No sediment is removed from the system; indeed, quite the opposite, sediment is added to the system via beach recharge, although as this is shingle it will largely be retained locally; and d. Net transport rates are slow and shingle is retained within the Minsmere Sluice – Thorpe Ness sub-cell (as shown by our reporting and several external reports, including the SMP). The development is not predicted to have impacts upon the sandbank as it will not disrupt the sand supply pathway to it (ie there is no pathway to impact). See our response to B1.12 regarding the precautionary approach (SoCG; Ref. 9.10.12) and how monitoring extents are always larger than the predicted impacts, to allow for uncertainty (see CPMMP and (CG.1.3 response to ExA at D2). The adaptive CPMMP can, and will if needed, be evolved to identify impacts moving beyond the SZC monitored extents. There is sufficient regional monitoring data to use as baseline if the extents require expansion, and the intention is that any such expansion would be done in advance of impacts reaching monitoring extents. Preparation and compliance with the CPMMP is a requirement on the DCO (Requirement 7A) and a Condition on the Marine Licence (Condition 17); see the latest version of the draft DCO (Doc Ref. 3.1(C)). The implementation of the CPMMP is intended to start at the start of

		construction and remain in place until the end of decommissioning (see CG.1.5 response for details [REP2-100]).
B1.17	It is noted the developer identifies the need to undertake more than 1D modelling and that the present modelling does not incorporate longshore sediment transport (despite making assertions that this approach is designed to have no effect on longshore sediment transport). It is considered unacceptable to the National Trust that this exercise has not been carried out so that effects on longshore sediment transport (to beaches and nearshore) and impacts to the geomorphology can be evaluated within this (DCO) process. It is unclear why the need to undertake such studies were not foreseeable and why such significant aspects of design for the coastal processes and geomorphology of the area have not been properly assessed by this stage in the development; instead a limited modelling extent has been presented with caveats and limitations for changes to design and evaluation out-with this DCO process and potentially ignoring the in combination environmental impacts from within the development itself.	Models of the SCDF and longshore transport are not required to make initial estimates on the behaviour of SCDF sediments, because we have models and measurements of the natural sediment transport at Sizewell and the SCDF in its simplest terms is a volumetric enlargement of the natural beach. Indeed, the 2D modelling (**BEEMS Technical Reports TR545** [REP3-048]) confirms the expected behaviours - for example that erosion pressure would rise if/when adjacent beaches become severely recessed and that would correspond to an increased supply to the immediately adjacent beaches, subject to the storm direction. The timeframe for presenting information around the finer details of mitigation (SCDF design and recharge frequency) is determined by its feed into the CPMMP (which was agreed with the regulatory Marine Technical Forum (MTF)) and design changes undertaken in January 2021 (see the **Volume 1, Chapter 2 of the ES Addendum** [AS-181]). The viability of the SCDF has been explored further in **BEEMS Technical Reports TR545** [REP3-048] and **TR544** [REP3-032] employing a range of 1D and 2D models for both sand and gravel sediments. The conceptual model justifying the impact (and in-combination) assessments [APP-311] and has been presented in **Volume 2 Appendix 20A** of the **ES** [APP-312] and has been subject to input from the MTF since 2015.

B1.18	Furthermore, it is unclear why a simplistic volume measure is deemed a suitable management approach to apply in this instance. The design is based on an indicative beach profile and it appears any evaluation to this point has been based on that profile form and its function; even under a 1D approach volume alone would seem a coarse measure and miss cross-shore and alongshore variability and how this may affect both the performance of the SCDF and the SCDF in turn affect them. Given that 'many different beach profile shapes' may emerge it is unclear how the identified lack of exposure (of the HCDF) can be guaranteed; indeed the green line on figure i (pdf page 11) shows an indicative profile lower than the SCDF buffer layer and SCDF sacrificial layer showing processes can achieve such forms and thus it has little meaning as such. It is thus unclear how it is not possible for exposure through to the HCDF (under certain conditions or combinations of conditions) over the whole life of the development.	The viability of the SCDF has been explored further in **BEEMS Technical Reports TR545** [REP3-048] and **TR544** [REP3-032] employing a range of 1D and 2D models for both sand and gravel sediments. The simplicity of the volume trigger and the potential for refinement has been recognised in these documents. However, performance of the SCDF is largely unaffected, since beaches move from one momentary equilibrium state to another in response to changing marine states on a meteorological timescale by reprofiling. HCDF exposure is not expected as SZC Co. has committed to maintaining the SCDF over the station life in order to avoid exposure of the HCDF and disruption to longshore transport. Furthermore, **BEEMS Technical Report's TR544** and **TR545** modelling [REP3-032 and REP3-048] shows this is not likely until well after 2100 and would be preceded by regime change (as the Minsmere shingle ridge, especially north of the sluice, is smaller in elevation and volume) and would be overtopped and breached well before any episodes of HCDF exposure.
B1.19	The Trust believes the declared fixity of the profile (or parts of it like the buffer layer) are relevant to impacts from the development and must be properly evaluated within the context of this DCO process, rather than being isolated for separate review under different processes at a later date. These later reviews might be more focused on the flood risk and coastal defence aspects of this part of the	The 'fixity' is an inaccurate interpretation on the part of the NT. The SCDF would be made of beach grade sediments and is only permanent in the sense that it would be recharged. The work to demonstrate viability of the mitigation will be presented within the examination period. The assessments of EIA for in-combination assessments has been completed and modelled. There are no significant in-combination impacts for coastal geomorphology. The

	development rather than on its long term impacts to the surrounding environment in concert with all other parts of the development (including matters such as BLFs, intakes outfalls, ship movements, dredging, mooring etc).	SCDF mitigation and the CPMMP (with additional beach mitigation of required) ensure longshore transport is not disrupted through to the end of decommissioning. Flood risk and coastal defence are separate matters.
B1.20	The Trust remains concerned that much more detailed information is required to properly evaluate the impacts of the development on coastal processes and geomorphology. It remains unclear how the developer can claim that the SCDF is 'designed to avoid disruptions to longshore transport' when they have not modelled this and when they are introducing a large volume of material to the system and making the distribution of sediments coarser than those naturally occurring. We are concerned there is uncertainty as to how and where the sediment will move to. Whether it may become a static feature or ephemeral sediment supply has not been defined.	The modelling performed in **BEEMS Technical Report's TR544** and **TR545** [REP3-032 and REP3-048] is not to assess impacts of the SCDF rather to evaluate how frequently it would need recharge. The stated purpose of the SCDF is to maintain the SZC beach frontage so as to avoid HCDF exposure and disruption to longshore transport. Retaining the beach clearly achieves this purpose, although it is acknowledged that severe recession of the lateral beaches would lead to a foreland which may temporarily or permanently slow longshore transport across the frontage - this would however be balanced by the increased erosion pressure and supply of imported sediment eroded from the SCDF. Monitoring and mitigation methods as proposed in the CPMMP will detect and correct (mitigate) any deficits arising as a result of the SCDF mitigation itself causing a disruption to sediment supply. The principal aim of the proposals within the CPMMP is to ensure that residual SZC impacts do not propagate to regional scale effects. The range of mitigation measures proposed alongside recharge is intended to ensure that there is no pathway to propagate localised impacts into effects on adjacent shorelines. Monitoring is

		specified that allows for any potential propagation of effects outward from the localised see response to B1.12. Viability has been assessed to the (projected) 2099 SLR, extending well into the decommissioning phase and the period to 2140 will be assessed in modelling work and the results will be issued at Deadline 7.
B2.1	The section of the report mentions issues we have highlight above such the introduction of over 1.3M m3 of coarse sediment to the frontage which may yield different impacts to local beaches but also different impacts to bar and bank systems seawards of the recharge. The placement is further seawards that the previous consideration of SCDF and interacting with other new features such as BLFs; it is unclear that this has been designed to meet the design criteria identified as there is clearly a substantial amount of work on the design to yet be implemented by the developer.	The sediment volume of the SCDF has been explored in **BEEMS Technical Reports TR545** [REP3-048] and **TR544** [REP3-032] and an estimated worst case operational phase requirement of 270,000m^3 presented (a conservative estimate likely to exceed the true requirement). The principal aim of the proposals within the CPMMP is to ensure that residual SZC impacts do not propagate to regional scale effects. Monitoring is specified which allows for any potential propagation of effects outward from the localised impacts - see response to B1.12.
B2.2	The Trust believes the report contains a number of shortcomings that we identified in previous reports on coastal processes as set out in our Written Representation. We believe the report presents assumptions and broad statements with little supporting evidence in an overly complex and somewhat confusing mash of numbers, hard statements around topics that have not been evaluated and selective statements where they have. As stated	The assessments are holistic and have been purposefully designed to provide a spatially and temporally extensive quantitative description of the environment backed up by extensive modelling studies so as to understand the full extent of environmental impact of the station. Risks to the station are an engineering matter and dealt with under other regulatory mechanisms. The station impacts are small and do not intersect with the National Trust frontage (with the exception of occasional thin layers of sand temporarily

	previously the matters presented focus on the SZC frontage only; as previous concerns of NT the focus is to the developers own needs rather than to the interaction of this with the surrounding environment	deposited following dredging). The focus of the proposed monitoring and mitigation of assessed impacts is to assure that the coastal geomorphic processes (principally the free movement of sediment under natural forcing past the SZC site) can be maintained. The SCDF and CPMMP [REP5-059] meet this aspiration.
B2.3	In the introduction (pdf page 12) the report acknowledges the SDCF involves the placement of 'large volumes' of sediment and that this is designed to withstand storms thus maintaining the promontory effect of the development in such situation. This advance seawards of both hard and soft parts of the defence design gives potential for interference to processes that operate moving sediments to north and south both along beaches but also with the intertidal and subtidal areas too and alters the interplay of sediment exchange between the shoreline and offshore. The erosion resistance of the selected material will also tend to maintain this affect but if /when mobilised will introduce (artificially) a higher volume of less mobile sediment size(s) to the system. The higher crest than naturally occurring on the SCDF will alter wave runup and backwash processes as it will be potentially above any washover and to maintain a steeper angle (than native materials). Even on a basic level it is unclear how this is	The SCDF would be based on the present-day shoreline position and does not advance it. It also does not create a promontory - that would only occur by way of natural recession of the adjacent shorelines. Sediment is moved by sediment transport processes, we would not consider this 'interference' in those processes. Storms will mobilise sediment from the SCDF in the same quantities that would occur on a natural beach. Were the beach to oversteepen this would increase the supply rate from the SCDF, which in turn reduces steepness. A high crest level is a necessary part of the design to retain the beach. The crest level will not affect run-up as the present beach is not overtopped in any case.

	not disrupting longshore processes and will not impact local beaches.	
B2.4	The Trust can only assume (as there is no evidence in the report) that the developer believes any eroded material is immediately transported to adjacent beaches. However, if this is not the case the placement of large volumes of sediment may lead to coarser sediments accreting, alteration to the plan form of the beach and the shallow bay forms that exist within the (developer defined) GSB area and affecting the known interaction to sediment transport processes that happens from Thorpness. Indeed, the developer makes reference of the hard point created by the Minsmere Sluice and how this influences processes but fails to recognize any interference of advancing seawards further (offshore) than that structure along at least a 750m frontage. Against this context it is not considered defensible to make such a sweeping statement in the introduction such as "…to avoid disruptions to longshore transport…" based on such limited assessment and design methods.	Transport patterns from the SCDF can be determined using basic coastal processes, which the Applicant has studied extensively through sediment transport measurements and models, as well as recent SCDF modelling (**BEEMS Technical Reports TR545** [REP3-048] and **TR544** [REP3-032]). Clearly sediment mobilised from the SCDF is incorporated into the active beach volume, but as noted for B2.3, the active volume is the same volume which the storm would have mobilised on the natural beach. This volume (Vstorm) is simply a smaller fraction of the total beach volume, and so a given event does not erode as great a proportion of the barrier i.e., Vstorm/[V[beach+SCDF] << Vstorm/Vbeach. This is the purpose of the SCDF. The second to last sentence of B2.4 fails to acknowledge that the HCDF would not be exposed, and therefore there are no impacts from it. Aside from avoiding HCDF exposure, the effects of the SCDF mitigation are intended to add sediment to the system, and the monitoring included in the **CPMMP** [REP5-059] is designed to monitor its performance and establish if any disruptions to sediment supply occur (eg which might occur in the receded adjacent shorelines case), and then correct these using the beach mitigation methods. No mention has been made of advancing the shoreline beyond the line of Minsmere sluice outfall - the nature of this comment is unclear.

B2.5	In the second paragraph of the introduction the developer states "As the SCDF is designed to avoid impacts of HCDF exposure during the construction and decommissioning phases, it is embedded (primary) mitigation…." However, it also sets up impacts of its own that are beyond the HCDF; so, this may solve some aspects of the HCDF impacts whilst introducing new impacts of its own. This matter highlights the applicants continued approach to dis-joint components of design and the failure to draw them back together in an integrated way. The HCDF impacts have not been re-evaluated following the further design information presented nor has the SCDF. Both have not been evaluated together for the conditions that may prevail over the whole life of the development. To claim that the SCDF is 'embedded mitigation' is also unclear in that it is not certain that it will (aside for the immediate SZC frontage that the placed sediment will add sediment volume to adjacent beaches); the volume could be transported in an offshore direction by processes such as draw-down and serve no such purpose. The assertion that the sediment of this size is not present apart from in the storm beach could reflect sampling technique but also ignores that this SCDF beach is being built seawards of the naturally occurring beaches (and so could behave very differently). This is further exacerbated by the fact that it also relies on	The SCDF reduces the potential for impacts from the HCDF to a low level of risk, hence its definition as mitigation. The residual impacts (potential impacts on longshore processes increasing in the long-term) are recognised and additional secondary mitigation proposed in the **CPMMP** [REP5-059] (as noted variously and in B2.4 above). There is no evidence that the pebble component of the beach shingle will be moved offshore, and this is backed up by all observations of shingle behaviour and subtidal sediment sampling at this site to date. The SCDF does not advance the present shoreline.

	previous assessment work (we have commented upon) where no amendment in method or update has been made related to any issues raised.	
B2.6	The developer states in the introduction that “Optimisation will consider present day conditions as well as future pressures on the frontage, such as sea level rise (SLR) and receded adjacent shorelines, both of which are likely to increase erosional tendencies on the Sizewell C frontage over time”. Again the emphasis remains to the SZC frontage rather than its impacts on the surrounding coast but what this does highlight is the promontory affect for the HCDF/SCDF approach presented will become more pronounced over time and so will its interference with the coastal processes as a result.	The emphasis on the SZC frontage is because this is where the SCDF is to be placed and it is not necessary to optimise its performance on the basis of storm erosion volumes measured elsewhere. The viability of the SCDF up to the projected 2099 SLR has been explored further in **BEEMS Technical Reports TR545** [REP3-048] and **TR544** [REP3-032]. Further assessment extending well into the decommissioning phase and the period to 2140 will be assessed in modelling work and the results issued at Deadline 7, with particular reference to the potential for a developing promontory to affect longshore processes and the potential for secondary mitigation measures to address this.
B2.7	Footnote 6 (pdf page 12) states clearly that there is no intent to maintain the SCDF for at least the last ten years of the operation. It is unclear how, with uncertainty in so many aspects, that such a decision can or should be taken or asserted at this point in time or why avoiding the impacts of exposure of the HCDF suddenly becomes irrelevant ten years before the end of the operation.	The comment made it somewhat misleading. The footnote text states "The SCDF would be maintained until (at least) around 10 years before the end of the decommissioning..." and "The SCDF would be maintained until (at least) around 10 years before the end of the decommissioning." This means that the **CPMMP** [REP5-059] would run until the end of decommissioning, but the assessments regarding the HCDF would begin ten years before the end of decommissioning. At that time, the assessment may supersede the CPMMP - and so there is potential that, subject to

		approval, it may be replaced. Unless that were to occur, the CPMMP would run up until the end of decommissioning.
B2.8	Footnote 7 (pdf page 13) refers to other beach recharge schemes, but it is unclear the particular sets of processes operating on this coast are the same as those cited. For SZC there is strong linkage between the beach and supratidal area to the nearshore and subtidal area; sediment interchange and movements between these and alterations to geomorphology of either can feed-back change to the other aspect; this is thus more complex than some linear beach systems where impacts have been seen alongshore including spit development, for example or retaining fixed beach positions by recharge or mechanical interventions. This is a complex matter, but the assessment of impacts should not be passed over just because the generic method of beach recharge has been applied successfully (or not so successfully) elsewhere.	Clearly the processes operating at Sizewell differ in their detail from all other sites; however, most beaches are characterised by strong linkages between subaerial and subtidal sections (including those examples cited) and beach management countrywide is predicated on a number of widely applicable principals leading to suite of general methods. The complexity of coastal geomorphology is not unrecognised by the Applicant, and the proposed approach is not 'generic' but based entirely on a large body of scientific evidence and the conceptual model specific to the Sizewell site presented in **Volume 2, Appendix 20A** of the **ES** [APP-312], allowing established beach management methods to be tailored to the specific requirements of the site.
B2.9	The developer states in 1.1 Background (pdf page 13) that 'Soft shoreline engineering… …locally reduce erosion'; as an approach it may or may not reduce erosion per se but it may provide some reduction to the impacts of erosion on the coast (particularly as conceived here to provide sacrificial material to protect the HCDF). However, most of the SCDF appears to be about retaining a fixed buffer of	This is a misrepresentation of the role of the SCDF. It is also important not to confuse impacts with natural coastal change. The whole SCDF is indeed available to be eroded - it is, after all beach, grade sediment. However, as the objective is to avoid HCDF exposure and disruption to longshore transport, the conceptual SCDF includes an inner safety buffer layer that is not intended to be eroded, and an outer layer that is intended to be eroded and

	sediment rather than all being sacrificial; the developer states "Unlike hard defences, which are immobile ….soft defences work with nature, dissipate energy, supply additional sediment to coastal systems (in the case of the SCDF and beach recharge in general) and therefore benefit local shorelines." this is only applicable to the sacrificial sediment part of the SCDF and not the whole system (as presented) and then only to the extent that the sacrificial sediment becomes mobile (being coarser); the remainder is intended to be immobile and not feed to the system but remain in situ as a buffer and so the impacts the developer identifies of "…tend to reflect wave energy during storms (causing enhanced scour and sediment loss)…" could be realized. This would be particularly the case where cobbles are used and also the approach seems to assume that the interstitial spaces of the (initially) placed sediment will not be in-filled by wind and water borne finer sediments (over a period of possible many years) which would tend also to lead to greater cliffing in the sediment and even more wave reflection.	then replenished. It is incorrect to state that the buffer layer is immobile and this was not stated in our reports. The comment on our text "…tend to reflect wave energy during storms (causing enhanced scour and sediment loss)…" has been taken out of context - this text refers to an exposed HCDF, not to the SCDF - the SCDF beach grade sediments would absorb wave energy in the same way a natural beach would. The potential cobble core of the SCDF is proposed as a 'failsafe' counter measure to ensure that the (finite) risk of exposure of the HCDF does not lead to lowering of the beach due to scour and so facilitates ongoing beach restoration and management. Potential infilling of interstitial spaces has been recognised as a potential (natural) development over long periods of time - however, should this occur in any appreciable volume, the effect is simply to move the whole beach closer toward the natural state of the active beach, in which cliffing and associated wave reflection are regular occurrences. Also, on the natural beach's supra-tidal the degree of infilling is low, which is expected to be the case for the SCDF - this means that during storms the SCDF beach will function naturally, with the interstitial spaces dissipating wave energy as water infiltrates and exfiltrates these spaces.
B2.10	Although the developer has not modelled alongshore processes it identifies in 1.1 Background (pdf page 13) that "SCDF sediments may also contribute to reducing erosion rates and promoting an increase in supratidal shingle on	Alongshore processes have been modelled - see **BEEMS Technical Reports TR545** [REP3-048]. A promontory spread alongshore may equally be considered simply a curving shoreline (depending probably on perceived scale). We concur that the

	the immediate neighbouring frontages” without stating they may not contribute in such a way. If we accept this proposition, then all this is stating is that the promontory effect of the SCDF/HCDF would be spread further alongshore without consideration of what this means to the plan form of the coast or the processes operating. Also it should be noted that if such a process can arise with redistribution of the SCDF sediments then it can also arise with the present sediment; that is the accumulation areas (at either end of the development) may trap sediment presently on the beach which would be reducing the longshore availability of sediment thus disrupting this process until the in-filling has stabilised (if indeed it does stabilise - this could be an ephemeral and difficult to predict storage and release of sediment that might impact under certain conditions or combinations of conditions). Clearly this needs full and proper assessment but if the developers statement held true it would mean that there would be a change in the morphology influenced either side of the development and those changes (in turn) could affect the adject beaches and so on; this is how impacts that might appear localised can start to (over time) have influence across a much wider section of coastline (taking the whole extent of the beach and the nearshore into	function of the SCDF is to mirror the present process as described in the comment. The performance of the SCDF has been explored in **BEEMS Technical Reports TR545** [REP3-048] and **TR544** [REP3-032] with additional updates to be submitted at deadline 7. Results [REP3-048] show that, as the shoreline north of SZC retreats and increases the shoreline angle from the SZC boundary (as is occurring naturally), this locally increases the rate of longshore transport northward from the SZC frontage toward the embayment under E and SE waves. However, the volume of sediment transported also increases with the shoreline angle and the presence of the SCDF i.e., feedback countering the formation of the promontory. This additional sediment volume counters the low (and declining) beach volumes observed on the Minsmere Frontage (which can be considered its 'buffer') acting as a 'sacrificial volume' for the eroding section and simply acting as a short-term beach recycling/recharge driven by natural processes.

	account) than just the immediate few hundred meters around a 750 m long coastal defence.	
B2.11	The Trust is concerned regarding the consideration of vegetation within the report. It is unclear how the step forward to suggesting only positive outcomes for vegetation is made on pages 13 and 14. It seems incongruous within a 1D model report for beach recharge and should be at least addressed under a separate heading with the evidence supporting the statements presented. Some statements also seem of little value – for example it is unclear what relevance stating a "…c.1.6 x factor of safety (erosion resistance) over bare sand" has when this is not bare sand beach it is a pebble beach and so clearly not a sand dune system. However, the placement of an open pebble beach is likely to intercept (and potentially prevent) aeolian transport to landwards as it will present a greater roughness element than a sand or mixed sand and gravel beach and allow void spaces for the sand to fall into and become trapped (both contributing to filling the void space and reducing the natural process of sand transport landwards that would otherwise have occurred). Furthermore, the developer identifies "Natural England condition surveys show that the annual vegetated drift lines were degrading in the early 2000's and were lost by 2010 (DEFRA MAGIC, 2021). This was due to natural	The statement regarding bare sand is relevant because the discussion is based on a sand model output and the beach is known to be a mixed sediment feature (for which there exists no suitable model; note though that gravel sediments have been modelled in **BEEMS Technical Reports TR545** [REP3-048]). The suggestion of benefit to the vegetated drift lines is based on the process described in response to B2.10, for the Minsmere frontage. It is expected that the provision of additional sediment into the local adjacent beaches will reduce the rates of beach volume loss and retreat, hence no cessation of processes supporting drift lines and longer-term maintenance of the present conditions. The introduction of imported sediment may lead to a wider and more stable supra-tidal area where it is presently very narrow, allowing a return of the former levels of annual drift line vegetation shown in Natural England's condition reports. The sediment volume of the SCDF has been explored in **BEEMS Technical Reports TR545** [REP3-048] and **TR544** [REP3-032] and an estimated worst case operational phase requirement of 270,000m^3 presented (a conservative estimate likely to exceed the true requirement). The supra-tidal zones of the natural beach and SCDF would be very similar (pebbles) and so there would be no

	coastal squeeze between the relatively static shingle ridge and the landward recession of the intertidal zone"; if more (up to 1.3M m3) of coarser sediment is introduced to the coastal system then this can only exacerbate this process identified by Natural England, leading to a more fixed upper beach and a narrowing and recessing lower foreshore; this leads to a situation where the coast is more vulnerable to sudden change.	change in the way that pebbles influence aeolian transport and trap some sandy sediments in the surface layer.
B2.12	On pdf page 14, the developer states "SCDF sediments are expected to be sourced initially from earth works on the main development site (assuming appropriate sediment properties) and then from already licenced aggregate extraction sites" this infers the excavation hole to landwards of the defence line, this is different to the inferred extraction of beach sediment in the footprint of the HCDF – clarity on this is sought. Either way, it is unclear if processing of sediment is proposed (it is unclear that pure pebble seams with no fines exist and so removal of finer or coarser material than that specified would be necessary) and how such an operation would be undertaken and any residual material handled requires clarity.	Any suitable sediment within the development footprint may be used as a source for the SCDF. Whether processing is required is not yet known.
B3.1	The design principles set out on pdf page 15 states "The purpose of the SCDF is to avoid disruptions to longshore transport and the impacts to local beaches that are likely to	The SCDF's position is not seaward of the present-day beach. See previous comments on how the SCDF and CPMMP [REP5-059] will ensure there are no disruptions to longshore transport from

	arise if the HCDF were exposed…", this report has not evaluated the disruptions that the SCDF and HCDF combined can set up. We believe that, as presented, the SCDF presents a further seawards position to the HCDF (although variable in absolute amount further seawards) including a buffer zone (volume) that will not be allowed to erode; this will sit to some degree above the natural beach and so it will set up similar impacts to the HCDF. As this connects into the wider sedimentary system of this coastline (protruding into it) and will be instigated further offshore than the previous assessments have looked, it is likely this will affect a wider area of the coast than previously identified and is in closer proximity to the nearshore and beach bars and bank system (and hence interaction with them is more likely). This is coupled with the crossing of these features by the two BLFs, as such the in-combination consequences must be carefully looked at. It seems as if the developer is relying on (yet unmodelled) behaviour of the placed sediment to counter all the (yet) unassessed impacts. It is difficult to see how such a design principle can be achieved without undertaking at least 2D modelling with the structures (HCDF and BLFs and other infrastructure not assessed or presented) across an area of the GSB where the processes are identified to interact; this	either feature. The function of the SCDF has been explored further using 2D modelling in **BEEMS Technical Reports TR545** [REP3-048] and **TR544** [REP3-032]. The influence of localised minor changes in hydrodynamics due to the BLF piles on storm erosion volumes has not been directly assessed.

	would suggest that this assessment is simply insufficient for this assessment purpose.	
B3.2	The developer refers to Minsmere Sluice when referring to the HCDF impacts on pdf page 15 of the report. It is stated “The best local analogy for these impacts is the nearby Minsmere Sluice Outfall. The concrete outfall passes underneath the shingle ridge and through the active beach face to a position well beyond the low tide mark (Figure 1), thereby acting as a blockage across the entire longshore shingle transport corridor. However, its elevation around the Mean High Water Neap contour allows some shingle to pass over the outfall during high waves and water levels, equating to a partial blockage.” It is unclear how something set at a low level on a point of the coast is a good analogy to something set well above present day predicted Highest Astronomical Tide (HAT) levels in the upper beach where the developer is suggesting the coarse material all goes. The acknowledgement of only partial blockage, identifies that processes can operate over and past it in both north and south directions and also seems to ignore finer sediment that will move over it under suspension in turbulent conditions (although the proposition is being made that no shingle may pass it apart from on the upper beach).	The analogy is presented explicitly as 'the best local example'. It is a good analogy in as much as illustrating the principal of a blockage to longshore transport and the impacts to both sides, as described in the comment, and the impact scales appropriate to the local wave/tidal climate and associated rates of longshore transport.

B3.3	The HCDF and the buffer and /or cobbles of the SCDF are devised to be fixed and not eroded away, presenting an impermeable face to the alongshore processes; this could present a blockage to longshore processes in its footprint, potentially. Also, it is unclear why these assertions are being made about Minsmere Sluice but there is no assessment of the incombination effect of this “blockage across the entire longshore” particularly to shingle when the developer is placing (coarser than this) pebble sized sediment. This interaction should be assessed. If such a structure is exerting some control over the longshore processes it seems unlikely that the massive structure of the HCDF and fronting (seawards) SCDF which is designed deliberately to be less mobile than the native sediment would have no effect on the intertidal physical processes and how they operate and so also have the potential to alter morphology in addition to the direct impact to the shape of the coast from the footprint of the promontory so created by the developer.	The first sentence of this comment is incorrect - the SCDF pebbles (and cobbles if they are used) are beach grade sediments and would clearly be erodible if exposed to strong wave action. The erodible buffer layer is simply defined as a mitigation trigger (for when material should be replaced) to prevent exposure of the HCDF. Since it is the same material as the sacrificial volume, it remains a soft feature capable of adapting and modifying in response to natural forcing and is in no manner a blockage to longshore transport.
B3.4	The SCDF is designed (by the sediment size and recharge process) to be immobile under most incident wave and tide conditions, becoming mobile only in larger storm conditions. This being the case it can be considered as a fixed feature compared to the native mixed sand and gravel sediments. There is no consideration made of how	The SCDF would be similar to the present-day beach and therefore its surface sediments would be mobilised under similar conditions. The SCDF is mobile under large storms only simply because it is initially placed above MHWS. Once part of the active beach, there is no difference in mobility to the identical sediment from lower down the profile, hence no change in process. Much of this

	those sediments will accumulate or be transported away from the headland or diverted offshore by advancing the line seawards of the existing with the HCDF and SCDF together; and in this report the SCDF, alone, as it sits to seawards of the HCDF. The mobility under storm conditions has been determined to happen in at least a 1:12 storm event but there is no assessment of a single larger event that could alter the coast more significantly than a single or even multiple 1:12 year events. It is unclear how, sitting out into the processes and receiving more energy than the natural beach, the SCDF might not be removed entirely in a large storm event somewhere over the next 97 to 120 years. As such it remains unclear why larger events have not been considered even under a 1D exercise given the developer identifies it will take a storm to move the pebbles. It is unclear what mechanisms might cause gradual erosion; it would seem likely that erosion would be storm driven and episodic in nature rather than gradual unless there is a mechanism for movement under more everyday conditions. As there can be storm events that arise quickly and continue for some period on this coast, it is unclear how it can be guaranteed that a storm event (or series in quick combination) would not be of sufficient scale to erode away more than the 'trigger level' of volume or that conditions would allow for	comment appears to be based on a misinterpretation of this statement. The function and viability of the SCDF and the definition of buffer/trigger volumes has been explored in **BEEMS Technical Reports TR545** [REP3-048] and **TR544** [REP3-032], including 1:20 year design storms and a 1:107 year wave power storm event for SLR up to 2099.

	recharge to happen before another event takes place. Guaranteeing this would seem fundamental to the developers declared design objectives.	
B3.5	The impact of "…drawdown onto the beach face by backwash " as highlighted on pdf page 15 would be to place coarser sediment to the lower part of the beach profile; potentially this could bleed sediment to seawards of the low tide mark and hence move such sediment into the subtidal area. Alternatively it could accumulate on the lower part of the intertidal profile and build elevation there; altering the wave action and further impact the shoreline but this would be localised and hence diffraction/refraction around such deposition could also alter the incident processes to adjacent shorelines. It is unclear how only the potential to feed sediment to adjacent beaches has been identified rather than the potential to alter wave conditions, raise the bed (having similar blocking affects to those identified for Minsmere Sluice by the developer), or altering the plan form of the coast and hence how the response of the coast (including longshore transport and interplay of the beach with the nearshore) is altered by the development.	The drawdown and cycling of coarser supra-tidal sediments into and out of the beach is a natural process and would be no different in the maintained beach / SCDF. There is no evidence that pebble-sized shingle will be moved offshore, which is shown by observations of shingle behaviour and subtidal sediment sampling. The performance of the SCDF has been explored further in **BEEMS Technical Reports TR545** [REP3-048] and **TR544** [REP3-032] with additional work to be submitted at deadline 7. Results [REP3-048] show that, as the shoreline north of SZC retreats and increases the shoreline angle from the SZC boundary (as is occurring naturally), this increases the rate of longshore transport northward from the SZC frontage toward the embayment under E and SE waves. However, the volume of sediment transported also increases with the shoreline angle and the presence of the SCDF i.e., feedback countering the formation of the promontory.
B3.6	The Trust is concerned the developer does not seem to be presenting a balanced view across all potential outcomes	There is no evidence that shingle will be moved offshore, which would be in contrast to all observations of shingle behaviour and

	across the lifespan of the development but focusing only to the potential to protect adjacent areas by the addition of coarser sediment to the upper beach (once it has been drawn-down, mobilized, re-transported landwards and then accumulated to the upper beach only on beaches adjacent to the development). This does not, however, identify the impacts that such change will have in the interim before any redistribution to this final resting place happens. (It is assumed that all the eroded material from the SCDF arrives to neighbouring beaches and adds to volume there); it could require a storm of larger magnitude to re-entrain larger sediment from the (relatively) deeper water conditions (lower foreshore under the tide) to return it to the beach where it eroded from	subtidal sediment sampling at this site to date. Furthermore, it does not have a 'final resting place' remaining within the active beaches within the SZC sub-bay (as per BEEMS Technical Report TR420 and the associated conceptual system model synthesised in Volume 2, Appendix 20A of the ES [APP-312]). The performance of the SCDF has been explored in **BEEMS Technical Reports TR545** [REP3-048] and **TR544** [REP3-032] with additional work to be submitted at deadline 7. Results [REP3-048] show that, as the shoreline north of SZC retreats and increases the shoreline angle from the SZC boundary (as is occurring naturally), this increases the rate of longshore transport northward from the SZC frontage toward the embayment under E and SE waves. However, the volume of sediment transported also increases with the shoreline angle and the presence of the SCDF i.e., feedback countering the formation of the promontory.
B3.7	As the SCDF is seawards in a more energetic location to start with it is possible that large volumes of SCDF sediment could be trapped to the lower foreshore for some period of time (even years) interfering or even blocking longshore sediment transport. Over time, it is also possible that the presence of coarser material could lead to increased mobilization and winnowing of finer sediment in those adjacent areas (leading to depletion of finer sediment until coarse armouring of the surface takes place). This could possibly increase erosion for some time to the lower	The SCDF is not at a more seaward position at the start - it would be developed as part of the present-day shoreline. Pebble size sediments are retained on the subaerial beach above low tide; sandy sediments would be exchanged between these zones under natural processes as presently occurs. Fine sediment is presently mobile in even low energy conditions. Beach steepening/narrowing is a natural process observed along much of the Suffolk coastline. The relatively small volumes of shingle proposed for the SCDF are unlikely to affect either process in any detectable way.

	profile and leave the upper profile more exposed to the next storm event. As a result it is possible that the beach profiles change in their geomorphology leading to steeper, narrower beaches that have less fine sediment in their appearance.	
B3.8	As this design has only been modelled in 1D such processes are not accounted for in the modelling applied in this report. It is unclear why more extensive modelling has not been presented for assessment as it is a basic matter to consider and evaluate and can be modelled 25 (although the developer does recognise that modelling mixed sand and gravel, or in this case mixed sand and gravel and pebble, beaches is more of a challenge than a unimodal sediment approach). The National Trust consider it unacceptable that 2D modelling (to account for different sizes of sediment) has not been applied as a part of this (DCO) process and that the statements made do not reflect the range of outcomes that could arise; all of which need assessment to consider their impacts on coastal processes and geomorphology (not just beach profile but also planform and nearshore interactions, wave reflections, sediment interactions etc including how the bar system responds under storms naturally and how this might alter were more coarser sediment available of beach form to landwards different to what it might naturally be.	It is not currently possible to model beaches with mixed particle sizes (ie sand and pebbles in this case). The function of the SCDF has been explored using 1D sand and 1D gravel (pebbles and fine cobbles) models in **BEEMS Technical Reports TR545** [REP3-048] and **TR544** [REP3-032], judgement and knowledge of processes for mixed beaches is used to assess how the SCDF will respond. The most likely scenario will be between the sand and gravel model outputs and closer to the gravel result (owing to parameterisation of exfiltration and infiltration in the gravel model). The full range of modelling in [REP3-048] tests grainsize sensitivity using both sand and gravel models, as well as 2D modelling.

	Such modelling must also integrate the HCDF/SCDF with other aspects of the development including the (temporary and permanent) BLFs.	
B3.9	The developer states on pdf page 17 that "The three primary design parameters used to increase the longevity of the soft defences are volume, crest elevation and particle size. The SCDF design seeks to optimise both parameters…" (noting that three parameters have just been identified it is unclear which one become irrelevant) "…to maintain the SCDF and avoid HCDF exposure whilst minimising intervention across the life of the station." These design principles all lead to the retention (for most of the time) of a headland made by the combination of the HCDF and SCDF. The SCDF is thus much less mobile in intent and design to both the natural beach but also potentially compared to other beach recharges; this is inevitable in this case as the beach being formed is seawards of the natural beach making its own promontory and hence somewhat detached from the adjacent beaches and their processes; bearing in mind the bay form the SCDF sits in (identified by the developer as the GSB) this has potential to alter that bay form and hence impact on a much longer section of coastline that the focus to only the immediately adjacent beaches. Again this supports the call from the National Trust for monitoring along a much wider	For clarity - 'both parameters' should refer to all 3: of volume, crest elevation and particle size. The SCDF is placed above MHWS in the first instance, so does not advance the shoreline - the capacity to develop a promontory is considered in **BEEMS Technical Reports TR545** [REP3-048] and **TR544** [REP3-032] and in further modelling to be submitted at deadline 7. This will investigate the shoreline evolution as discussed in the response to comment B2.10. As already noted, the promontory would form due to recession of adjacent shorelines and is not expected to be a prominent feature of the coast for several decades. The principal aim of the proposals within the **CPMMP** [REP5-059] is to ensure that residual SZC impacts do not propagate to regional scale effects. The range of mitigation measures proposed alongside recharge is intended to ensure that there is no pathway to propagate localised impacts into effects on adjacent shorelines. Monitoring is specified which allows for any potential propagation of effects outward from the localised impacts.

	frontage including the National Trust frontage of beach and cliff to the north and the call from others for monitoring to Thorpness to the south.	
B3.10	The developer states on pdf page 17 "The SCDF respects Pye and Blott's (2018) guidance that management of shingle features for FCERM purposes does not disrupt regional coastal processes and does not have negative impacts on other shingle feature interests such as vegetation, fauna, geomorphology, landscape quality and visitor appeal." It is unclear how this assertion can be made given the current design as articulated (and it is notable the desirable outcomes here are not expressed in the design principles). It may be the case that the guidance is highlighted as forming some of the measures to assess acceptability of the SCDF as presented but it is far from clear that it meets them or that sufficient assessment has been presented and/or made to support that it respects such matters.	Beach management countrywide is predicated on a number of widely applicable principals leading to a suite of general methods. The proposed approach is based on a large body of scientific evidence and the conceptual model specific to the Sizewell site presented in **Volume 2, Appendix 20A** of the **ES** [APP-312], allowing established beach management methods to be tailored to the specific requirements of the site.
B3.11	The developer states on pdf page 17 "That is, SCDF recharge would occur in areas where vegetation is naturally lost" it is unclear how this can be asserted when the SCDF is an unnatural intervention, located seawards of the natural beach position, formed of coarser sediment and thus is an artificial feature placed on the coast rather	The upper reaches of the SCDF would be planted and further natural colonisation may also occur. Recharge would, of necessity, take place on sections of the SCDF which have been eroded back to the trigger point, implying loss of any beach which might have been supporting vegetation. Thus, potentially allowing recolonisation, as described. Dynamics of adjacent beaches are

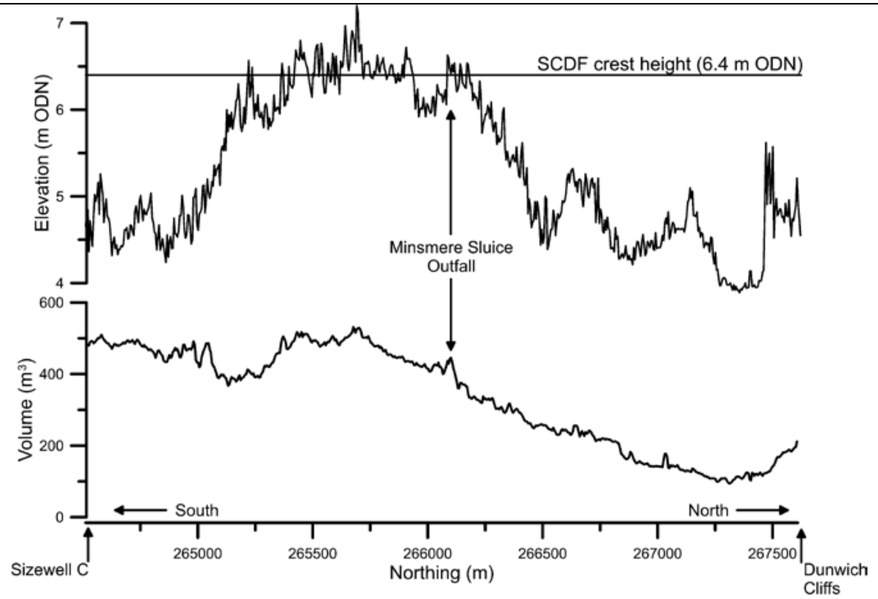
	than a natural beach. The natural loss of vegetation on this section of coast will not arise as the HCDF and SCDF are constructed in the location they might naturally arise. Were natural roll-over of sediment to be applied they may have a more sustainable future bearing in mind the nature of them is to be 'lost' to erosion and then re-establish in more quiescent conditions. This element of dynamics is important to many driftline species and shingle species and by the developers own admissions the SCDF will be more static than natural conditions and the adjacent beaches may be impacted by coarser sediment making the upper profiles there more fixed. Furthermore Figure 3, (pdf page 18) for example, shows the situation of the fixed hard defence landward of a mobile beach but does not provide comparison to natural roll-over and evolution	not altered and SCDF sediment is within the natural range. The SCDF is placed above MHWS in the first instance, so does not advance the shoreline. The future with and without SZC and the SCDF are similar - for the former a wide supra-tidal area would be maintained for 100+ years, and for the latter that supra-tidal zone would be created by roll-over as the coast recedes until, that is, it encounters the Bent Hills at which point coastal squeeze can be expected and the habitat lost. It is possible that this would occur within the SZC timeframe, indicating that maintained wide supra-tidal SCDF could host vegetated shingle for a longer period.
B3.12	The developer states on pdf page 18 that "…SCDF reprofiling is not intended"; it is unclear if this logic is also applied to the recharge of the SCDF or if it will always be replaced by recharge to the originally defined profile (an unnatural linear slope) which will then require re-working.	The intention is that the SCDF would be generally profiled to a mean slope, but not with any degree of fine tuning as the sediments will naturally be reworked to equilibrium with the local conditions. The subsequent evolution of the beach under natural coastal processes would be reprofiled, for the reasons stated above.
B3.13	The developer asserts on pdf page 18 that the "The relative volume of sand in the SCDF would be kept low, to increase permeability and erosion resistance. This avoids	The final material composition of the SCDF has not been determined, however the statement that "the SCDF (as presented) has no sand and is a unimodal pebble material" is incorrect and

	cliffing that can occur in recharge sediments where the sand volumes in mixed sediments are too high. Any cliffing that does occur would be the result of the natural mixing of sand volumes being exchanged between the subtidal and intertidal beach rather than a result of the SCDF. Review of experience on the UK's south coast (McFarland et al, 1994) found that finer material in the sediments used on gravel beaches leads to a more compact and less permeable beach, and a hard, vertical face." The Trust is unclear exactly what the point of this statement is; whilst the SCDF (as presented) has no sand and is a unimodal pebble material this does not guarantee the introduction of finer sediment to the (when placed) open matrix and so it seems unclear what the developer is trying to identify here. The retention of an open matrix of just pebbles would seem implausible to be guaranteed in a system where sand particles are in motion (accepting that plumes have not been modelled by the developer) in suspension and so can be deposited by tidal action (and so may mobilise and in-fill the interstitial spaced of placed pebbles and hence remove this 'erosion resistance' and leading to cliffing in the future under a large enough event). It is also possible that aeolian transport (which form dunes along this coastline) could transport sand to the SCDF and become deposited in the interstitial spaces that way. It is illogical to say that trapping	also not possible to achieve. The target, subject to further modelling results and consultation with the regulatory Marine Technical Forum, is for pebble material, preferably coarser than the modal size (around 10 mm) with low volumes of sand (not no sand, as stated). Sandy material will be worked into and out of the beach under natural coastal processes. As with the natural beach, the sand content in the supra-tidal zone would be low, which reduces mobility. Storm activity may introduce finer material to the SCDF and this would tend to move the distribution toward that of the present beach. However, the fraction of the SCDF affected by storms will be worked into the active beach.

	of any such sediment in the interstitial spaces is not a produce of having placed large sediment with an open matrix to the beach in the first place; it is also the case that sediment locked into the interstitial spaces would be removed from the naturally available sediment and only released under more extreme conditions than would otherwise (naturally) be the case.	
B3.14	The developer identifies on pdf page 18 the shoreline south of the SCDF is stable and that to the north retreating and presents a "…mode of retreat…" which identifies the "…shingle barrier is presently too high and large for overwashing and barrier roll-back to occur. However, with time and sea level rise, infrequent overtopping can be expected to become more regular…" As this is being identified as a known change process it should form part of the assessment of the interaction of the development with the coast particularly as the introduced sediment has the design qualities to be liberated to such beaches, and the developer believes they will add further to the "too high and too large" barrier and hence cause impacts to the natural coastal processes and geomorphology in this way. The addition of coarser material to the upper part of the beach will tend to steepen it and (when mixed with the native sediment) may lead to an increase steepness in profile and/or more wave reflection. As the developer identifies	Sediment added from the SCDF to the adjacent frontage will move within the active beach and add to the volume of the lower beach. It would not add coarse material to the upper beach. Furthermore, the erosion of supra-tidal SCDF sediments to the intertidal will widen the beach and reduce the profile steepness. Shingle is not expected to move out of the GSB in large quantities - the BEEMS modelled and measured evidence synthesised in **Volume 2 Appendix 20A** of the **ES** [APP-312] shows that shingle is largely confined to within the bay, and furthermore there would be no shingle losses as the SCDF would be a net contributor to sediment supply. The estimated lifetime volume of the SCDF is unlikely to result in detectable changes if distributed over a wider area.

	the fact that shingle sediment can simply by-pass the Minsmere Sluice there is potential for such sediments to be redistributed along the GSB. Over the period to 2140 identified in this report, the change to what is identified to naturally arise and hence could cause consequences (impacts) to frontages to the north including to the National Trust, means further assessment should have been made by this stage of the process.	
B3.15	Footnote 15, (pdf page 18) identifies that the SCDF sediment will only be liberated "…onto the southern few hundred meters of the Minsmere frontage, where it may be retained." If this were the case then over time this would alter the alignment of the coast and thus lead to a different evolution than would have naturally occurred; this should be assessed including in the context of the wider GSB and in terms of the potential impacts to sediment movement.	This comment is misleading due to the partial quotation of text – the footnote states that "<u>This means there is potential for transport of SCDF sediment</u> during SSE storms onto the southern few hundred metres of the Minsmere frontage". SCDF sediments will disperse in both directions, subject to the storm conditions at that time. Sediment released on to the eroding shoreline is unlikely to result in accretion, but could reduce erosion rates. The intention is for the shoreline to evolve differently to that occurring naturally, by slowing the rate of retreat and reducing the deepening of the sub-bay defined by the Minsmere sluice and SZB outfalls.
B3.16	Figure 4 (pdf page 20) shows an irrelevant line for the V recharge. Given the fact that different profiles could evolve for the SCDF (after placement/after recharge) it is unclear why only a volumetric approach is proposed. The exposure of the HCDF is relevant at higher elevations as much as at	The caption and text of Figure 4 (pdf page 20) make it clear that the line separating the buffer and sacrificial layers is illustrative – it is the intention that a volumetric trigger is used as the primary means for triggering recharge.

	lower elevations so it is possible that a flattening of the profile could meet the volumetric approach identified but still expose the HCDF and hence fail the design performance intended by the developer	
B3.17	We are unclear whether the developer's statement on pdf page 19 that "a 6.4 m (ODN) crest, which is similar to the present-day shingle ridge, albeit 1 – 2.4 m higher" can hold true. If it is 1-2.4m higher it is significantly different to the present-day shingle ridge. It is also unclear how there will be no interaction of the "active beach face" and the portion above such a defined face; as that alters so will the profile above it potentially (particularly as this is designed to only be mobile under storm conditions when draw-down of sediment to seawards is the most likely process identified.	The ridge is similar, but higher, though the statement itself was one referring to links to landscaping and not coastal processes The higher ridge crest is a climate change adaptation to account for sea level rise. The present-day shingle ridge at Sizewell C is a manmade structure, built when following the construction of Sizewell B as part of their defences. It is incorrect to say that it is significantly different to the present-day shingle ridge. As shown in our response to ExQ1 BIO.1.75 [REP2-110] (see Figure below), the SCDF crest would be similar in elevation to the central section of Minsmere ridge (which is over 7 m ODN in places) and have a volume larger than that of the RSPB reserve section but slightly smaller than the central and southern Minsmere ridge. The highest parts above the active beach will only be modified by storms with high enough water levels to interact and draw sediment down. Otherwise, it will not be mobile.

		
B3.18	The developer adds that "The northern side of the SCDF was modelled following a similar contouring process but respecting the SZC Main Development Site boundary; therefore, the slope of the SCDF was adjusted to gradually meet the natural topography before the property boundary." It is unclear why this limitation is a necessary constraint on the design and functioning (meeting a boundary) rather than being designed to the processes.	Such a slope is respectful of beach processes and landscaping - a vertical wall of sediment on the northern edge is not, and would not be permitted.

B3.19	Option B in Figure 4 (pdf page 20) "features a relatively narrow band of coarser sediments (cobbles) at the SCDFs landward extent" it is unclear the width of this band. This is applied to be much less mobile than the pebbles but might be more mobile than the boulders placed; it presents a rip-rap layer and so should more reasonably be shown as part of the hard coastal defence measures.	The fine cobbles proposed are beach grade material – at 0.08m diameter, they are indeed mobile whereas rock armour (>1m) for all intents and purposes is not. The cobble layer is one proposal only and not a detailed or confirmed design – its location and width have not been finalised, nor has its inclusion in the design. As loose sediment, only slightly larger than the native particle-size range, it is not part of the HCDF – it is misleading to consider it part of the hard defences.
B3.20	The developer has (self-imposed) limited the storm impact to a 1:12 year storm for the sea level rise to 2069. It is unclear why this limitation has been set by them for the long term of this development and they themselves state on pdf page 21 that "…further modelling work is required to refine and establish volumetric losses associated with more severe storms". Why has this not been done to establish the impacts of more severe situations than a 1:12 and +50year SLR. Evaluation of the envelope of forces that could arise over the 120 year period (so to 2140, almost a century further in time than currently assessed) should be made at the outset if this is important mitigation of the developments impacts and to prove the concept is sustainable across the lifetime of the development. It also draws into question the assessment made of the volumes presented as sacrificial and as a buffer.	NT has misrepresented the position as no 'self-imposed limitation' was set. The impact of storms including 1:20 year design storms and 1:107 wave power events with SLR up to 2099 on the SCDF has been explored in **BEEMS Technical Reports TR545** [REP3-048] and **TR544** [REP3-032] and this will be extended in further work up to Deadline 7 to cover the decommissioning phase.

B3.21	It appears that the interaction of the permanent BLF does set up difference along the frontage and how the SCDF interacts with it; even on a 1D approach. The statement that nearly 3.5x more sediment is needed to the north of the permanent BLF than near it suggest significant differences being set up here; any further modelling (more than 1D modelling) must include the permanent BLF in it; and also evaluate the situation with and without the temporary BLF.	The sediment requirement is based on achieving the SCDF profile presented due to the beach width and does not reflect any influence of the BLF. Present trends do, however, show natural present-day erosive trends in the BLF area (compared to stability over much of the remaining frontage). This is not related to the BLF.
B3.22	It is unclear why the consequence of "…shoreline curvature around the north face" of the SCDF (as stated on pdf page 21) is not incorporated to the design of both the SCDF and potentially the HCDF as this could impact the interaction of longshore processes and on-off shore sediment mobility. The approach the developer is taking is to simply place more sediment there rather than address the impacts being caused through design.	The limits of the HCDF are defined by the development boundary. The SCDF is mitigation for any potential impact on longshore transport. The reference to curvature relates to the large volume of SCDF sediment in the area – it may be desirable to recharge at a different threshold in this area to maintain a smoother transition between the maintained and Minsmere frontages.
B3.23	The developer is adding a note that the natural ridges will be overtopped before the SCDF is, but this does not present what impacts might be caused by the SCDF not being overtopped; there could be reflection and/or backwash and lowering of beaches to seawards as a result and steepening of the beach profile fronting the SCDF as a result and destabilizing its toe. The lack of adjustment (as	The beach response to the SCDF will be identical to the response to the present ridge and this is not overtopped either. Viability of the SCDF has been explored in **BEEMS Technical Reports TR545** [REP3-048] and **TR544** [REP3-032] and this will be extended in further work and the results will be issued at Deadline 7. As the particle size will be similar to the native sediment, the range of slopes will also be similar. Oversteepening will increase

	the crest remains and the seawards extent does too, could also alter the coastal processes and hence impact on sediment transport processes compared to that naturally occurring. The approach could lead to the release of large volumes of the SCDF in a short timespan to seawards which could take a considerable time (potentially until a large storm arose again) to be re-worked elsewhere (as re-profiling has been ruled out by the developer already): This could also set up changes to the coastal processes that have impacts to the coastal geomorphology. The developer remains focused to the SCDF and its role towards the HCDF rather than considering the impacts that might arise of the interaction of the SCDF itself with the environment.	erosion from higher elevations during storms and move that sediment down the beach, restoring a lower slope and adding sediment into the longshore transport pathway.
B3.24	Footnote 19, pdf page 24, refers to "…predictions early in SZC's decommissioning phase (2099)"; it is unclear why this is an important point in time. It would be pertinent to consider the whole of the development lifespan to the end of decommissioning.	The quoted date arises from SLR projections, not from SZC timelines – the standard UKCP18 predictions run until 2099. Viability of the SCDF has been explored in **BEEMS Technical Reports TR545** [REP3-048] and **TR544** [REP3-032] and this will be extended for the full decommissioning phase to 2140 and the results issued at Deadline 7.
B3.25	Although the SCDF pebbles may sit within the identified sediment sizes found within the natural system it precludes all finer sized sediments (at least at placement and before interstitial spaces become in-filled) so does not present a natural sediment or even similar but slightly coarser grain	The natural beach sediments are mixed on the intertidal zone and very low in sand content (around 10%) in the supra-tidal zone. The SCDF design plans are in keeping with this natural ratio. The distribution of particles for SCDF creation and maintenance will not be unimodal. However, one of the objectives of the SCDF is for it

	size distributions as used on other soft coastal defence schemes. It is unimodal and coarse and this is deliberate in the design to make it more stable and less erodible as a sediment; the consequence of this it will form steeper slopes than natural sediment (looking different and behaving differently with coastal processes) and maintain a promontory of the sediment on the coast that will interrupt coastal processes and impact on the geomorphology.	to erode no faster than the beach would naturally, and to supply additional sediment into the coastal system. The reason for the former element is to ensure the maintenance is disruptive to the beach system, without compromising the SCDF's function of maintaining the longshore transport corridor and processes. In doing so, this would also avoid rapid depletion and reduce the risks of exposing the HCDF. Sediment drawn into the active beach will be mixed with the native distribution and any impact on beach slope is unlikely to be discernible within the normal range. The monitoring proposed as part of the **CPMMP** [REP5-059] will monitor SCDF performance and assess any disruptions to longshore transport. This monitoring is combined with the available mitigation methods as set out in **Volume 2 Chapter 20** the **ES** [APP-311] to address any disruptions (thereby avoiding HCDF exposure or as a result of a protruding SCDF (due to natural adjacent shoreline recession)).
B3.26	It is unclear that the 3.2 to 6.4cm grain size distribution would be available (naturally arising) either within the development site or from a licenced aggregate site. This suggests processing shall be needed leading to overflows at dredging sites or washing from land sources; nothing has been presented on the impacts of such matters.	This size class refers to the very coarse pebble range, which is within the native particle size range. Sources of sediment remain to be determined and will be refined and finalised in consultation with Marine Technical Forum. The impacts of licensed extractions will be covered under their separate licences.

B3.27	The developer states on pdf page 25 that “The SCDF sacrificial layer is effectively a ‘real-time’ recharge method for sediment losses that occur during storms.” It is unclear what proposition is trying to be presented here. The recharge of the SCDF does not happen in real time, it happens in advance of an event and may be re-worked prior to such event and during it, the ability to provide “recharge” (which the developer might mean to areas that are impacted by the development) will depend on the nature and scale of the event which will need to be sufficiently large to mobilise the artificially skewed (coarse) distribution of the sediment; this cannot be a guaranteed process to happen in “real time”. The storms are eating away (potentially) sediment volume and thus it is probably best to call this a sacrificial placement of sediment as it will be eroded away but where it will move to is less certain (based on the information provided). As it is intended to replace the sacrificial amount to the original volume each and every time such a storm impacts the coast this may be replacing the SCDF before sediment has moved elsewhere, fully re-establishing the impacts from the SCDF promontory it forms and leaving eroded SCDF sediment elsewhere.	The 'real time recharge' referred to occurs on adjacent beaches, during times when the active beach has been depleted sufficiently to begin drawing sediment from the SCDF.
B3.28	The developer states on pdf page 25 that “The cobble-sized sediments would have a degree of mobility (albeit	It is argumentative and very misleading to compare fine cobbles of 80 mm (<u>mass ≈ 0.7 kg</u>) with 10T (<u>mass = 10,000 kg</u>) rock armour.

	less than coarse pebbles)…", this is an obvious statement in the same way that the 10T rock of the HCDF could have a degree of mobility but this will be less than cobbles, potentially. This is further rather irrelevant as these are buried to the back of the buffer zone of the SCDF that is not intended to be exposed or mobilized and hence why would these cobbles be mobile. This could be the case in an storm (probably greater than 1:12) that removes all the SCDF sediment but the design presented suggest that the inner part of the SCDF is never exposed and is recharged before such a situation would ever arise - it cannot be both ways so it is unclear why this is being presented in this way. The National Trust would support clarification on this matter,	The former would be mobile during storms but as a beach form is well known to broadly retain its shape and dissipate energy. The latter is designed to be immobile and would reflect wave energy, increase turbulence and scour the beach most likely leading to a break in the longshore transport corridor. The primary aim of the SCDF is to avoid this situation. The potential role of a cobble layer is, as clearly explained in the report, to preserve a beach face in the event of a (highly unlikely but still finite risk) storm (or storms) of sufficient magnitude to erode the buffer layer of the SCDF before recharge can take place. The increase in erosion resistance provided by a cobble layer within the buffer layer is designed to avoid HCDF exposure.
B3.29	It is more realistic to present these cobbles as an alteration of the hard defence design but if the designer believes cobbles can be mobilised then they could also cause damage (abrasion, impact etc) to the hard defence and be abraded/ chattered themselves and also transported elsewhere to potentially accumulate. It is noted this is not claimed to be within the natural sediment distribution of the beach. The developer further states that "Dynamic cobble berms are an effective form of soft coastal defence…" it is unclear that this is what is being proposed here.	A cobble berm is one proposed as a potential soft coastal defence option for mitigating the residual risk of HCDF exposure from extreme events. Well-designed, the cobbles would only move against themselves, and then only for the period of exposure as the pebble SCDF would be re-instated. Even if they were to interact with the geologically very hard rock armour, the duration would be short and effects on rock armour difficult to quantify in terms of changing the standard of defence. Dynamic cobble berms are an artificial replication of a cobble beach, and hence a form of soft defence.

B3.30	Figure 4, pdf page 20, shows the cobbles at the toe of the HCDF and buried beneath the SCDF recharge beach on the same profile as the HCDF and not as part of the beach profile form. It is hard to see how this would not have a large percentage of the void spaces in-filled by smaller sediments (including those blown in by wind or washed in by rainfall). Also, it is unclear with no re-profiling whether more cobbles would be introduced if the starting ones were moved. The developer should clearly state the intent for cobbles or that the SCDF cannot be sustained and cobbles are needed; (even during the latter stages of decommissioning) in which case their impacts should be fully evaluated. As these are being presented for stability reasons the impacts of promontory formed by them is closer to the HCDF than the SCDF and thus can be considered an extension of the HCDF.	A cobble berm is one proposal as a potential soft coastal defence option for mitigating the residual risk of HCDF exposure from extreme events. The inclusion of a cobble berm nor its exact location has been confirmed. They will be the subject of discussion with the MTF. The cobble sediments would be buried at the point of installation, and so would not be subject to the natural processes of infilling. Furthermore, the natural sediments on the supra-tidal have a low sand content. Were the cobble layer to be exposed, modelling and the scientific literature shows that its shape would be re-profiled but there would be very little loss. The cobble layer would then be reprofiled and the pebble SCDF reinstated. The cobbles are functionally not a form of hard defence.
B3.31	To suggest that "Were the SCDF's cobble sediment layer to be exposed, it would still function as mitigation, allowing native pebbles to pass over it and to dissipate wave energy into its porous matrix." assumes it remains in situ and is not in-filled with sediment in advance of exposure. As exposure will be in a large storm event (having removed all the sacrificial and buffer SCDF) it is unlikely they will function in the way being presented and hence not form mitigation to the exposure of the HCDF but could set up	A cobble berm is proposed as one potential soft coastal defence option for mitigating the residual risk of HCDF exposure from extreme events.

	impacts of their own, further seawards, as 'volume loss is not expected'. In short what is being presented is that the cobbles do not move very much and so remain a fixed position on the shoreline and (effectively) an extension of the HCDF. The impacts of this have not been presented.	
B3.32	The developer states on pdf page 26 that "The use of a cobble berm would facilitate longshore transport of shingle (compared to an exposed HCDF)" It is unclear how this facilitates such movement longshore of sediment except that it forms a promontory of relatively fixed nature that would be exposed further offshore than the natural beach and hence (like any headland) act to transport sediment away from it to either side and potentially to be transported in an offshore direction. In short this would accelerate the transport processes above those which might naturally occur on the beach (which would naturally be landwards of this position and with a wider foreshore seaward of it (to remain in situ).	A cobble berm is proposed as one potential soft coastal defence option for mitigating the residual risk of HCDF exposure from extreme events. It would be recessed deep within the SCDFs buffer layer. Were it exposed, it will behave as a beach and support longshore shingle transport and natural recovery as it is dissipative and so will support shingle deposition much more readily than exposed rock armour.
B4.1	It is unclear why consideration of the profile to place sediment (aside from a single 1:7 slope) or recognition that it may alter to physical events is not considered as part of the recharge process. It is also unclear why there is no seismic assessment for the SCDF that (in the lack of re-profiling) could also demand recharge. Although less active	Slope is considered and identified as not crucial to the function of the SCDF. It is well known that beaches will reshape themselves and that efforts to reprofile beaches to a particular shape only reduce the natural functioning of the beach and so are not recommended (aside from placement as a reasonable slope, hence our identification of the mean slope). We are unaware of any

	than the natural beach (due to size) it is envisaged for it to be altered by physical processes and that should be relevant for future management and recharge decisions.	beach recharge schemes that have been seismically assessed, nor the need for such an assessment.
B4.2	The frequency of recharge is uncertain. We note the developer has limited the consideration of this to 'parameters available in this report' which do not reflect the full span of the development; it is unclear why that is the case. It is also difficult to assess how unlikely three sequential; 'Beast from the East' (BfE) style events will be in over a hundred years' time but it is likely that larger events than the quoted 1:12 year BfE storm will arise. We could have 1:100 or 1:120 year storms. These larger events are particularly important for long term coastal change and large-scale coastal evolution and how the development may both cope with such events and interact and hence cause impacts with such events is not presented. It is not clear why the developer is limiting their assessment in this way. The National Trust remains convinced that for long term coastal process and geomorphological consideration it is necessary mitigation to both regularly monitor the NT beach and cliff frontage and the nearshore banks and bars to seawards (at minimum) through the life of the development.	NT is correct that recharge frequency is uncertain and cannot be precisely predicted (as is the case for all beach recharge schemes). The viability of the SCDF has been explored in **BEEMS Technical Reports TR545** [REP3-048] and **TR544** [REP3-032], including the impact of 1:20 year design storms and 1:107 year wave power events with SLR up to 2099 and this will be extended to include the decommissioning phase (to be reported at Deadline 7).

B4.3	It is unclear why the developer has applied only a 60 year operational phase to the assessment.	This is the length of the SZC operational phase.
B4.4	The developer claims on pdf page 27 to have applied “Several layers of conservatism…” but it is unclear that this is the case (as parameters are limited by them) or that these do address uncertainty in any reasonable way. It would (on the other hand) be an unnecessary impact of the development to place more coarser sediment than is needed; thus expanding the footprint of the works further seawards than needed, introducing more coarse sediment to the coast that needed, and consuming more resources than needed. It is unclear from the approach presented that it is a sustainable one (noting option B has a back-stop of a cobble berm) or that there are no other solutions to mitigation of the HCDF impacts that could be applied than the SCDF; consideration of approaches that are more in-keeping with the natural coastal processes and geomorphology and not (of themselves) leading to potential impacts.	The viability of the SCDF has been explored in **BEEMS Technical Reports TR545** [REP3-048] and **TR544** [REP3-032], including a 1:107 year wave power event and 1:20 year design storms from NE and SE directions. The volume of material required continues to be considered, but represents a balance between function, resilience against the risk of low frequency high magnitude events, and longevity (minimising the frequency of recharge interventions). This is in part a calculable physical balance and numerical data is presented in **BEEMS Technical Reports TR545** [REP3-048] and **TR544** [REP3-032], but is equally a matter for regulatory stakeholder-driven consensus and an ongoing matter for the MTF. It is worthwhile to note that to achieve the same level or protection (whilst minimising exposure risk of the HCDF) finer sediment sizes would require a larger mass; the use of coarser sediment helps to ensure that a larger footprint is not needed. Aside from fine tuning we are not aware of other methods that would be effective at maintaining the frontage and longshore transport.
B4.5	Whilst the developer has applied UKCP18 predictions, it is known that these assume there is no change to the offshore Dunwich Bank; it is known that this has altered	The viability of the SCDF has been explored further in **BEEMS Technical Reports TR545** [REP3-048] and **TR544** [REP3-032], including 1:20 year design storms from NE and SE directions and a

	historically and when it has done so the nearshore bars also alter and so do the beaches. The potential for such change should form part of a proportionate assessment of the interaction of the development with coastal processes and geomorphology.	1:107 year wave power event with SLR up to 2099, both without the bank present. This more than accounts for the bank over the station life, as there is no suggestion that there will not be a bank.
B4.6	The developer asserts on pdf page 26 that "The model results used to set Vsac,min is highly conservative – the model set up over predicts erosion and shows losses several times greater than observed." It is unclear what 'observed' is referring to noting that the interaction of the SCDF has not yet happened and there are no observations of it, it is unnatural and of different sediment distribution than the natural sediment distribution; it is unclear what point is being put forward here.	As stated clearly in the report, the model is calibrated against observations of the present-day beach response to measured storms at Sizewell and other modelled storm erosion data are compared with observed storm erosion as measured by site monitoring.
B4.7	The developer states on pdf page 28 in respect of Figure 8 "The histogram of volumetric changes between surveys (expressed per year) for all bins (Figure 8) shows that erosion and accretion are fairly balanced across the survey area i.e., the distribution is near symmetrical." It is unclear how this then ties to "…This reflects the results of previous studies that show no net seaward loss of shingle, cross-shore exchange of sand in and out of the subaerial beach (subtidal sand is abundant), low longshore transport rates, and very low longshore shingle loss in the Minsmere to	All studies show low levels of net shingle movement and shingle volume change. The pebble component of beach shingle is spatially limited above the subtidal, as shown by extensive sediment sampling whereas the subtidal zone is sandy.

	Thorpness embayment (BEEMS Technical Reports TR107, TR403 and TR420)".	
B4.8	It is wholly possible for sediment volume to remain around a mean (in a data set taken over a relatively short period of time and at distinct intervals of the beach profile cycle between storm and swell conditions that simply means the beaches change in profile on a seasonal basis (it will also alter in sediment composition, slope etc as a result). Such change does not infer sediment is only retained within the length of cross shore (exposed) beach; it is entirely feasible that sediment exchange happens with the subtidal for some distance offshore as the profile is effectively an extension of the beach until a point of closure or separation (e.g. by a geomorphic features or bedform formed by marine processes); indeed when sediment is lost from the profile exposed beach profile it must go somewhere and when it gains volume it must come from somewhere.	Sediment sampling has shown that coarse sediments are absent from the subtidal and hence that they are not exchanged, unlike the sand fraction.
B4.9	It is also feasible for beaches to appear the same (when exposed at low tide) but they undergo significant changes when underwater leading to a depth of disturbance to the sediment (which can alter its properties), thus it is possible that sandy sediment is disturbed, mobilised, exchanged and redeposited to leave a similar volume (averaged across an exposed beach profile) before and after. It is	The sediment volume of the SCDF has been explored further in **BEEMS Technical Reports TR545** [REP3-048] and **TR544** [REP3-032] and an estimated worst case operational phase requirement of 270,000m^3 presented (a conservative estimate likely to exceed the true requirement over the operation phase) – the figure stated of 1.3Mm^3 is not recognised and is not part of the evidence base. The design effect of this mitigation on the

	acknowledged that the existing processes are relatively low in magnitude compared to some more dynamic coastlines, but this should not infer they are any less sensitive to change. If the developer believes this is an entirely closed sedimentary system, then it is unclear why they believe that introducing over 1.3Mm3 of pebbles to it (or a similar volume of pebbles and cobbles) will not impact upon it	sedimentary system is to maintain longshore continuity of the maintained frontage.
B4.10	The National Trust believes the figures presented in section 3 of the report should have their statistical significance presented and other meta data related to the presented information; only one set of data in Figure 11 has provided a statistical significance. The same is true for matters such as the “rate of volume loss or gain (between 2 and 4 m3/m)”. The SCDF recharge requirement are also being set in a context of beach profiles that sit landwards of the SCDF face (such as S1B5) so assessment might consider how different parts of the profile behave / how the SCDF will behave when it is seawards and so more exposed (in process terms) than locations landwards of it. To apply the volumes of change observed historically on the beach is probably understating what the processes at the face of the SCDF will be and hence it is unclear that the recharge volumes identified are conservative or not. Applying 0.4m of sea level only would seem unnecessarily limited and it is not clear that the assessment approach	The viability of the SCDF has been explored further in **BEEMS Technical Reports TR545** [REP3-048] and **TR544** [REP3-032] and this will be extended in further work which will be reported at Deadline 7. The SCDF behaviour is demonstrated by this modelling. To be as comprehensive as possible, we use both models and measurements, and within the latter we sought worse case scenarios identified previously and within the historical records (BEEMS Technical Report TR403 as synthesised in **Volume 2, Appendix 20A** of the **ES** [APP-312]). The lines on Figure 10 are drawn to represent the 2-4m^3/m lines and are not ‘fitted’ so do not show a statistical significance. The same data are shown on Figure 11 where a significance is given for the fitted line, representing the present erosion hotspot on the coastline. The text likewise discusses variation in rates across the entire frontage, including peak rates over shorter periods of more

	has encompassed the “envelope <of> the possible recharge requirements over SZCs operational life”. None the less the emphasis on a low erosion rate of the natural beaches is identified so it is the case that interruption to the processes does not have to be of a high magnitude to potentially impact upon these balances and lead to significant change across a wide geographical area.	rapid change, while Figure 8 also represents the range and distribution of rates of change.
B4.11	It is noted that the developer acknowledges (on pdf page 33) that the assessment is “approximate” and furthermore “The estimates in this report will be refined and incorporated into the CPMMP following more detailed modelling (including more sea level rise cases) and model improvements once additional calibration datasets have been secured”. It is considered by the National Trust as necessary to undertake this modelling, beyond a simple 1D approach, to allow a reasonable design to be formed and to test the principles of its 32 sustainability and impacts on the coastal processes and geomorphology (and other coastal receptors) as a part of this (DCO) process. We strongly believe this should not be set back to a later point in time under another process. The assessment of the design and behaviour (at minimum in the short term) should be made and should provide additional information that addresses the long term evolution and changes that might arise from it (which should be a combined	The viability of the SCDF is explored in **BEEMS Technical Reports TR545** [REP3-048] and **TR544** [REP3-032] and this will be extended to the end of the decommissioning phase in updated reporting at Deadline 7.

	assessment of the SCDF, HCDF, BLFs and other intertidal infrastructure) being implemented across the full lifetime of the development.	
B4.12	It remains the National Trust's contention that limited monitoring in close proximity to the development does not reflect the interplay the development will have with the processes and geomorphology of the area. The approach proposed sets up a promontory on this soft coastline that is intended to be maintained in position for all but the shortest possible time (when eroded) and the approach to the CPMMP needs to encompass a wider coast to reflect the GSB (at least). This need is rather supported by the assessments of beach changes over some kilometres of shoreline and the contention of a rather closed sedimentary system made in this and other reports. These show the importance of long term data, particularly when considering long term change.	Impact extent has been identified and assessed in **Volume 2 Chapter 20** of the **ES** [APP-311]. The principal aim of the proposals within the **CPMMP** [REP5-059] is to ensure that residual SZC impacts do not propagate to regional scale effects. Monitoring is specified in the CPMMP which allows for the detection of any potential propagation of effects outward from the localised impacts together with adaptive monitoring and the implementation of mitigation plans to respond appropriately. Whilst a promontory may be formed as a result of adjacent natural shoreline recession, this has been accounted for in modelling, would increase the rate of sediment supply from the SCDF and would be monitored to assess if the rate of additional sediment supply was not adequately compensating for any degree of promontory related disruption. Were that to be the case, the appropriate mitigation method set out in **Volume 2 Chapter 20** of the **ES** [APP-311] would be employed to mitigate the disruption.
B4.13	The National Trust repeat again the need for monitoring to include the National Trust's frontage, the Dunwich cliffs and the nearshore bank and bar system seawards of the National Trust's frontage and for that monitoring to be continuous to that proposed by the developer in a limited	Impact extent has been identified and assessed in **Volume 2 Chapter 20** of the **ES** [APP-311] and does not suggest impacts will reach the National Trust frontage. The principal aim of the proposals within the **CPMMP** [REP5-059] is to ensure that residual SZC impacts do not propagate to regional scale effects. Monitoring

	area along the SZC frontage and immediately adjacent to it.	is specified which allows for the detection of any potential propagation of effects outward from the localised impacts together with adaptive monitoring and the implementation of mitigation plans to respond appropriately
C1	EA	
C2	We note the EA's summary of their position on coastal processes as set out in the executive summary of their written representation (p.3) that "The sustainability of the Hard and Soft Coastal Defence Features (HCDF and SCDF) has not been demonstrated, and insufficient evidence has been provided to allow the impact on geomorphology and coastal processes to be understood." We support this view.	See Applicant's response to EA representation at Deadline 6. The EA position on sustainability as has evolved at Deadlines 5 and 6 following further work assessing the viability of the SCDF, explored in **BEEMS Technical Reports TR545** [REP3-048] and **TR544** [REP3-032] and this will be extended to the end of the decommissioning phase in updated reporting at Deadline 7.
C3	We note para 6.0 of the EA's written representation where they state they have revised their view on geomorphology and coastal process following the acceptance of changes to the DCO application. They now question the data applied and the plausible future scenarios with regards to the impacts of climate change. We support this view and note it accords with the comments contained within our written representation.	See Applicant's response to EA representation at Deadline 6.
C4	We note the EA view as set out in their written representation (para 6.2) that the SCDF now seems to be	See Applicant's response to EA representation at Deadline 6.

	an integral element of the functioning of the sea defences. We agree with this interpretation.	
C5	We further note the EA view as set out in para 6.3 of their written representation that they are awaiting further accompanying reports and that there remain significant areas of clarification required to give them confidence that the approach being taken is appropriate and fit for purpose. We support this view and are disappointed that all accompanying reports to support the submission in its current form have not been provided to the EA as a regulator.	See Applicant's response to EA representation at Deadline 6.
C6	MMO	
C7	We note the MMO's concerns and recommendation contained within para 1.14 of their written representation "that there could be geomorphic impacts from the capital and maintenance dredging required at the permanent Beach Landing Facility ("BLF") and recommends that this is monitored via the CPMMP. The MMO advises that additional surveys are undertaken 3 months and 6 months after the initial capital dredge to monitor this." We support this view but suggest such monitoring should be required following each dredging campaign as the prevailing conditons could alter and responses alter accordingly.	See our response to the MMO query at D6

C8	We note the MMO's request as set out in their written representation (para 1.15) "that the overall bathymetry of the banks are surveyed annually for the duration of the construction phase to monitor any changes to the outer longshore bar." The NT support this view and note that the longshore extent of this surveying should reflect that of the outer longshore bar and include the banks.	See our response to the MMO query at D6
C9	We note the MMO's reference to Harbour Powers within the DCO and specifically para 2.2.21 of their written representation that "queries the inclusion in 65(1)(a) "routes or channels in the harbour and the approaches to the harbour" as general directions can be used only within the specified limits over which the harbour authority is to have jurisdiction. The above may be outside of that area" The NT would want to understand the extent of the seabed and intertidal area over which the developer seeks to have control as a harbour authority as this is being sought because of the development. It is also unclear the extent of powers sought; where these relate to dredging and placement of sediment such powers could legally give the developer (as harbour authority) the ability to dredge or place (as yet unspecified) amounts of material.	Coordinates for the proposed Harbour limits are provided in the draft DCO and shown by the green broken line on the Works Plans. No additional powers for dredging or disposal apply over and above those already applied for as part of the deemed Marine Licence.

C10	The NT notes the MMO's position in para 2.3.3 (p.15) of their written representation on the removal of the HCDF from the DML as the MMO believe it will be located above MHWS which is outside of the MMO's jurisdiction. However, the NT believes it is unclear that this is the case as parts of the HCDF are below MHWS level and it seems may be exposed to tidal conditions dependant on the beach profile prevailing at the time. However, as these are limitations in the design they should remain within the DCO process until fully designed and assessed. We also note in the same paragraph that there is reference to ongoing discussions with East Suffolk Council, the MMO and the Applicant to determine how the SCDF should be placed in the DCO and DML. Again, the NT believes this should be consistent with the HCDF as they are integral to one another as works.	The NT statement is incorrect – no part of the HCDF lies below MHWS and therefore not licensable under the Marine and Coastal Access Act (2009). The HCDF and SCDF feature, and the CPMMP, will be integrated within the DCO and DML in accordance with the statutory powers of both ESC and the MMO.
C11	We support the MMO statement in para 2.3.11 (p.16) of their written representation re licensable activities where they state all disposal activity must be assessed against the Waste Hierarchy. NT support this view.	Noted.
C12	The NT note that para 2.3.18 (p.18) of the MMO's written representation refers to discussions with stakeholders. The NT will provide our comments on the HCDF and SCDF to	Noted.

	the MMO as a stakeholder and will request that we are consulted on any further matters that might arise	
C13	The NT notes mention by the MMO in para 2.3.23 (p.19) of their written representation to navigation lighting and would like to know to what extent these would be visible from NT property.	Deadline 3 Submission - Technical Note on Indicative Lighting Modelling rev 1.0 [REP3-057] provides details of proposed lighting associated with the permanent and temporary BLFs. Navigational lighted has yet to be confirmed with Trinity House (and the MMO). Visibility from neighbouring shores is unlikely to be significant but NT will be consulted when the navigational lighting plan is confirmed.
C14	The NT supports the concern of the MMO regarding impact (degradation) to the longshore bar as articulated in para 2.4.1 (p.21) of their written representation and note this feature extends along the NT frontage. We further note their concerns in the same paragraph regarding coarser sediment and note that coarser material is located in the dredged areas; it is thus conceivable for there to be an interchange with SCDF sediments. We note the MMO's recommendations regarding monitoring but would seek the adoption of a precautionary approach given the conditions will vary when dredging is carried out. We believe it is reasonable for such monitoring to be applied to each dredging operation as accumulation could arise in a different circumstance. For example if the conditions at the initial capital dredge are dispersive then this would risk	Nearshore bar change is covered within the monitoring under the **CPMMP** [REP5-059].

	allowing impacts to arise at a later date under another set of conditions for dredging. As a Harbour Authority it would be normal to monitor such activity but such information should be available for scrutiny.	
C15	The NT agrees with the MMO statement in para 2.4.4 of their written representation (p.22) that the evidence and information relied on by the applicant regarding sediment plumes is not clear; The NT has concerns that the behaviours of plumes from a range of construction activities have not been clearly determined.	Plume modelling is summarised in **Volume 2 Appendix 20A** of the **ES** [APP-312] **-** it is unclear which additional "plumes from a range of construction activities" the National Trust is referring to.
C16	We note and support the MMO's comments on Coastal Geomorphology set out in para 3.1.1 of their written representation (p.23). We support the MMOs view on the risk of scour associated with barges and tugs operating at low water depths close to the outer bar (see para 3.1.2). We believe that general deliveries (as they have now largely moved to marine transport from road) also require an assessment to address their potential environmental impacts properly.	Impacts from boat traffic on coastal geomorphology were assessed in **Volume 2 Chapter 20** of the **ES** [APP-311].
C17	The NT supports the MMO's comments in para 3.1.7 & 3.1.8 of their written representation (p.25) regarding underwater noise related to piling. We also agree with the MMO's statement under para 3.1.9 that a broader	This comment pertains to Marine Ecology. The reader is referred to **Volume 2 Chapter 22** of the **ES** [APP-317].

	consideration should be made for fauna and a wider group of cetaceans.	
C18	Whilst we agree with the MMOs view in para 3.3.1 of their written representation that dredging the BLF will cause impacts to coastal processes, the alterations to HCDF and SCDF combined could also have significant impacts. We are equally unclear why there has been no modelling of these impacts (nor to the HCDF/SCDF) but would urge that a wide range of conditions are encompassed in respect of the dredging activities identified here by MMO to reflect the range of conditions that may arise and variability in magnitude, direction, or nature of changes that arise.	See our response to the MMO query at D6.
C19	The NT supports the MMO's view as set out in 3.3.3 (p.27) of their written representation regarding the need for annual surveys of the outer longshore bar. We believe any such monitoring should extend along the length of this feature so that should any deterioration of it arise locally to the development that the impact of this migrating away can be tracked over time. NT would encourage this to at least include as far as the north of its frontage.	See our response to the MMO query at D6 and the **CPMMP** [REP5-059].
C20	The NT would concur with the MMO's view as set out in 5.1.1 (p.29) of their written representation that the focus of the impact assessment is to the shoreline and not subtidalarea and the geomorphic features of bars and	The assessments in **Volume 2 Chapter 20** of the **ES** [APP-311] identified no impacts or effects on the bank. Nearshore bar change is covered within the monitoring under the **CPMMP** [REP5-059] and was assessed. It would only be necessary to extend

	banks. We agree this remains a gap in the assessment and support further assessment of these matters as well as monitoring to capture data for such assessment. The NT is concerned that impacts that start locally to the BLFs or dredging activities could migrate along the bar length over time or cause changes that impact along the bar length over time; we would therefore support their monitoring and the inclusion of the NT frontage in this.	monitoring to the National Trust frontage were any local impacts to be observed to have migrated north out of the defined impact zone, as described by the comment. There is no evidence to suggest this would happen, but the **CPMMP** [REP5-059] is adaptive and would capture any such eventuality.
C21	The NT notes the MMO's response to CG 1.9 (as set out in p.52 of their written representation) that states "the MMO maintain the view that there remains a risk of effects around the interaction of the permanent BLF dredged area and the outer longshore bar which has not been considered because the applicant does not predict any significant effect from this. It is unclear what might be done to mitigate any unexpected effects there, we therefore recommend further surveys in the period following the completion of the dredged berth area for the permanent BLF." We note the MMO shares our views around impact to bars and uncertainty.	Despite no anticipated significant impact, nearshore bar change is covered within the monitoring under the **CPMMP** [REP5-059]. The principal aim of the proposals within the CPMMP is to ensure that residual SZC impacts do not propagate to regional scale effects. Monitoring is specified which allows for the detection of any potential propagation of effects outward from the localised impacts together with the adaptive monitoring and implementation of mitigation plans to respond appropriately.
C22	The NT notes in the MMO's response to CG 1.10 (as set out in p.53 of their written representation) that the MMO believes other interested parties will be a part of the Marine Technical Forum; this is not what the CMMMP states and	The NT has misinterpreted the statement by the MMO. As stated in the ExA question (to which the MMO was replying) "The Marine Technical Forum has an independent chair, supported by a technical secretariat supplied by SZC Co. together with nominated

	NT consider that this latter document should be changed to incorporate the NT as an interested party and near neighbour	technical representatives from Natural England, the EA, the MMO and the East Suffolk Council, and any consultants working on their behalf." It is these interested parties that the MMO was referring to – there is no statement suggesting attendance should be extended to other members (although other stakeholders may attend as observers at the invitation of the chair if this is felt to be useful in the functioning of the MTF).
C23	The NT notes and supports the MMO's view as set out in its response to CG 1.11 (p.53 of their written representation) that it would expect to see an assessment of the expected impacts on the WCS associated with the HCDF presented through the examination process. We also note that parts of the HCDF sit below MHWS level.	See our response to the MMO query at D6
C24	The NT notes and supports the MMO's view as set out in its response to CG 1.13 (p.54 of their written representation) regarding its recommendations for additional surveying to a) confirm the low sedimentation rate in the dredged area and b) confirm the early response of the outer longshore bar to the dredged area.	See our response to the MMO query at D6 and the **CPMMP** [REP5-059].

APPENDIX H: RESPONSE TO RSPB AND SWT COMMENTS ON THE OUTLINE DRAINAGE STRATEGY

CONTENTS

TABLES

1 RESPONSE TO RSPB AND SWT COMMENTS ON THE OUTLINE DRAINAGE STRATEGY

1.1 Introduction

1.1.1 This document serves to address the comments made by the Royal Society for the Protection of Birds (RSPB) and Suffolk Wildlife Trust (SWT) submitted at Deadline 3 [REP3-074] in relation to the application by NNB Generation Company (SZC) Limited (SZC Co.) for an Order granting Development Consent for the Sizewell C Project, specifically in relation to drainage and the **Outline Drainage Strategy** [REP2-033].

Table 1.1: Response Table

Para	Question / Comment from RSPB and SWT (Section 2 of REP3-074)	SZC Co.'s Response
2.1	The following comments refer to the Outline Drainage Strategy submitted by the Applicant at Deadline 2. As noted in our Written Representation para 3.226, we require further details of the proposed mitigation to ensure that potential effects on hydrology on the neighbouring Sizewell Marshes SSSI and Minsmere to Walberswick SPA, SAC, Ramsar and SSSI are assessed appropriately.	Further details of the proposed SuDS and drainage design will be provided as appropriate both through this response and through the release of information as part of the design process
2.2	Overall, with regard to this strategy, we support the position of Natural England provided in their relevant representation and repeated in response to ExA Written Question (ExQ1) Bio.1.5710: *"groundwater impacts in relation to the Minsmere to Walberwick sites within our Relevant Representations (PINS ref: RR-0878, our ref: 306236, dated 30th Sep 2020): The drainage strategy and code of construction practice will mitigate against issues of increased discharge or run-off from the MDS during construction and operation. However, there is an important assumption here that the Drainage Strategy and Code of Construction Practice will be rigorously*	The **Outline Drainage Strategy** [REP2-033] has been written for and is being implemented in the design process to ensure that sensitive surface water management will mitigate against issues of increased discharge or run-off from the MDS during construction and operation. SZC is and will continue to fully implement the Outline Drainage Strategy in this respect to ensure continued protection of the neighbouring Minsmere to Walberswick SAC, SPA, Ramsar and SSSI and Sizewell Marshes SSSI. Requirement 2 of the **draft DCO** (Doc Ref. 3.1(F)) secures that the construction works would be undertaken in accordance with the CoCP.

Para	Question / Comment from RSPB and SWT (Section 2 of REP3-074)	SZC Co.'s Response
	implemented. We recommend that these mitigation measures are secured in the requirements of the DCO. We advise that there is unlikely to be significant hydrological impacts on the following sites: *• Minsmere to Walberswick Heath and Marshes SAC* *• Minsmere- Walberswick SPA* *• Minsmere- Walberswick Ramsar site* *• Minsmere- Walberswick SSSI"*	Requirement 5 of the **draft DCO** (Doc Ref. 3.1(F)) secures that the surface and foul water drainage proposals must be based on sustainable drainage principles and must be in accordance with the Drainage Strategy.
2.3	Therefore, it is imperative that the measures proposed in the Outline Drainage Strategy are rigorously implemented to ensure continued protection of the neighbouring Minsmere to Walberswick SAC, SPA, Ramsar and SSSI and Sizewell Marshes SSSI.	Requirement 2 of the **draft DCO** (Doc Ref. 3.1(F)) secures that the construction works would be undertaken in accordance with the CoCP. Requirement 5 of the **draft DCO** (Doc Ref. 3.1(F)) secures that the surface and foul water drainage proposals must be based on sustainable drainage principles and must be in accordance with the Drainage Strategy.
2.4	Paragraph 1.2.2 (page 6) of the Outline Drainage Strategy notes 'the proposed development is to the south of Minsmere to Walberswick Heaths and Marshes SSSI, Special Area of Conservation (SAC), Special Protection Area (SPA) and Ramsar site1. We note the footnote reference provided by the Applicant is to the RSPB Minsmere website (but note this only	It is acknowledged that the footnote reference provided is to the RSPB Minsmere website which forms only part of the designated sites. To accurately reflect the designated sites, the reference within the **Outline Drainage Strategy** [REP2-033] will be updated to correctly reference the designated sites.

Para	Question / Comment from RSPB and SWT (Section 2 of REP3-074)	SZC Co.'s Response
	forms part of the designated sites). The reference to the RSPB Minsmere website is repeated in the references section 11.	
2.5	Paragraph 1.2.5 (page 7)12 mentions off-site developments associated with the construction on the main development site. We recommend that specific reference is included to the flood mitigation area on the marsh harrier compensation site which requires similar control measures to the areas already considered with the Outline Drainage Strategy.	The flood mitigation area would be constructed in accordance with pollution management controls described in the **Code of Construction Practice** (CoCP) [REP5-078], and thus in relation to the potential for release of pollutants such as suspended solids. The **CoCP** provides for all construction areas (including the FMA) and activities, and specifically considers those construction activities within proximity to watercourses and those activities including earthworks, for example. Once constructed the flood mitigation / habitat creation area is hydrologically passive, functioning very similarly to the existing greenfield baseline conditions.
2.6	We welcome removal of the footpath linking Pill Box field and Coronation Wood development to avoid loss to the SSSI as noted in paragraph 1.2.10 (page 8).	Comment is noted.
2.7	Paragraph 2.1.4 (page 11) considers rainwater harvesting noting that this will be 'assessed at the detailed design stage as part of the design process in order to maximize the economic benefit without compromising the sustainability of ecosystems.' We	Rainwater harvesting will be considered at detailed design stage on the basis that this is a water stressed area, therefore rainwater harvesting is considered beneficial. However, if the removal of water that would be more naturally returned to ground or fed to the SSSI under greenfield runoff is considered detrimental to the SSSI

Para	Question / Comment from RSPB and SWT (Section 2 of REP3-074)	SZC Co.'s Response
	require more information to understand how the economic decision will be balanced given the significant ecological importance of the adjacent wetland habitats and request more clarity on this point.	then the water will be released directly via SuDS structures. Due to the relative remoteness of the Campus (to which paragraph 2.1.4 refers) from the protected areas and the current stage of design development for the Campus this decision cannot be made at this stage. However any decision taken on rainwater harvesting will be consulted with stakeholders to enable a balanced environmental and sustainable solution to be reached. The inclusion of the word 'economic' is erroneous and will be removed at the next iteration fo the Strategy.
2.8	Table 2.1 (page 13) sets out design parameters for surface water drainage networks. With regards to Level of Protection we note that Any flooding under extreme storm conditions will be directed to locations that avoid damage to critical structures or buildings. To identify these routes a detailed analysis of the digital terrain model needs to be combined with flow path analysis.	The level of Protection as set out in the design parameters in Table 2.1 of the **Outline Drainage Strategy** [REP2-033] indicates that flow path analysis needs to be undertaken to identify routes. In any Infrastructure project assets and critical structures have to be protected. This is necessary to ensure the performance of the assets in the context of extreme and rare events.
2.9	We require more information on how this design parameter will be balanced with the proposal to 'encourage habitats for wildlife in developed areas and opportunities for biodiversity enhancement' in paragraph 2.2.2 (page 12) given the potential risk to the surrounding low lying wetlands that are designated for their exceptional wildlife interest but may receive	In the context of extreme and rare events, the routing of water away from critical assets does not by necessity increase the risk to surrounding habitats. Furthermore, for more common drainage scenarios, the **Outline Drainage Strategy** [REP2-033] clearly sets out how a sustainable water management approach proposed by SZC Co. seeks to protect existing habitats by mimicking pre-existing natural functions (e.g. infiltration and greenfield runoff

Para	Question / Comment from RSPB and SWT (Section 2 of REP3-074)	SZC Co.'s Response
	more water to aid the protection of critical structures and buildings.	rates). In line with the CIRIA SUDS Manual, the project additionally seeks to encourage habitats for wildlife in developed areas and opportunities for biodiversity enhancement. Importantly, these aspects are not in conflict within a sustainability-led water management approach.
2.10	Although paragraph 2.3.3 (page 14) states that 'the WMZs also provide compensatory area into which exceedance events may flow in a controlled manner', Table 2.2 in section 2.3.9 (pages 15-16) confirms that 100 year and >100 year return period events will exceed the parameters of the drainage infrastructure and water will be directed to low lying areas away from the plant (thus the designated sites). Our understanding is that this impact has not been assessed but would welcome more detail on this	The drainage infrastructure is designed to manage storms with a 1% annual event probability, with a further allowance for climate change. These are therefore rare and extreme events. In events of greater magnitude the catchment will behave very similarly to pre-existing baseline conditions. Any difference in performance between baseline and with scheme would be negligible in the context of the hydrology and movement of water through the catchment, including low lying habitats, during a storm of this magnitude. For example, fluvial flooding under baseline conditions in a 1% storm with 35% climate change allowance would cause a depth of flooding of approximately 1.5m across the Sizewell Marshes SSSI.
2.11	Also, in paragraph 2.3.3 (page 14) 'Drainage features should be located outside of fluvial floodplains where possible', how is it intended to manage where further detail suggests this is not possible as adjacent fluvial floodplains are largely designated habitat?	The flood risk to the project has been assessed within the **Main Development Site Flood Risk Assessment** [AS-018] and **Flood Risk Assessment Addendum** [AS-157]. This work has demonstrated the insignificant risk in relation to the siting of the project, construction areas and infrastructure in relation to modelled fluvial floodplains and Flood Zones. Any work within the

Para	Question / Comment from RSPB and SWT (Section 2 of REP3-074)	SZC Co.'s Response
		flood plain would be subject to consenting post DCO under the appropriate consenting regime (e.g. Flood Risk Activity Permit or discharge consent). The drainage design includes for the discharge of water into watercourses and thus within the floodplain. The detail of these outfalls would also be subject to the appropriate consenting / permitting regime. Under these permitting regimes the appropriate authority would consult with stakeholders in relation to the siting of infrastructure within designated habitats.
2.12	Section 2.5 Contaminant management (pages 20-22) indicates potential risks of contamination to surface water and groundwater and indicates principles by which this will be managed but concludes at paragraph 2.5.16 (page 22): 'The proposed SuDS to be constructed across the Sizewell C sites are indicated in this report. The detail for each WMZ and associated development site will be developed at the detailed design stage.'	The purpose of the **Outline Drainage Strategy** [REP2-033] is to set the governing principles and design approach. The Strategy has been supplemented by a series of drainage technical notes which have been entered into Examination at Deadline 5. Specifically, Appendices B - H to **SZC Co. Comments on Submissions from Earlier Deadlines** [REP5-120]. Further technical note submitted at Deadline 6 (**Appendix A** of Doc Ref. 9.63) and are proposed to be submitted at Deadline 7. The detailed design stage, post DCO, would further develop the detail of the designs for the MDS and AD sites.
2.13	Given that the WMZs have the potential to discharge to the adjacent designated sites (Minsmere to Walberswick SAC, SPA, Ramsar and SSSI and Sizewell Marshes SSSI), we request more detailed	Please refer to SZC Co. response to 2.12 in relation to supplementary drainage technical notes.

Para	Question / Comment from RSPB and SWT (Section 2 of REP3-074)	SZC Co.'s Response
	information to be confident that risks can be appropriately managed.	
2.14	In section 3.1a) Minsmere River and Minsmere Sluice (page 24) and b) Leiston Drain (page 25) the Applicant incorrectly describes the water flow at Minsmere Sluice, failing to acknowledge that water discharged from Minsmere River (New Cut) can share the southern chamber with the Leiston Drain, particularly at times of high flow. We believe that this is critical to ensuring that impacts from increased flows into the Leiston Drain do not affect the function of the Minsmere Sluice and therefore water levels in the Minsmere to Walberswick SPA, SAC, Ramsar and SSSI. We require confirmation that this has been taken into consideration	The assessments undertaken by SZC Co. demonstrates no increase in flows into the Leiston Drain. Correspondingly, there is no impact on the performance of the southern chamber of the Minsmere Sluice. The potential for interaction between the Project and the Minsmere Sluice has been collated into a technical note submitted at Deadline 6: 'Minsmere Sluice Operation Evaluation Technical Note' (**Appendix M** of Doc Ref. 9.63).
2.15	In paragraph 3.1.14 (page 26) the Applicant states that 'It is intended that by implementing this outline drainage strategy, through removal of surface water runoff by a combination of limiting flow to greenfield runoff rates and infiltration to ground, and subsequent permanent detailed drainage strategy, that no adverse changes due to development will be measures observed at Minsmere Sluice/Scotts Hall Drain. The	No response required.

Para	Question / Comment from RSPB and SWT (Section 2 of REP3-074)	SZC Co.'s Response
	drainage system will include flexible design whereby water movement can be influenced if required.'	
2.16	Given that this drainage could impact on the hydrology of the Minsmere – Walberswick SPA, SAC, Ramsar and SSSI intentions and unspecified flexible designs do not provide enough reassurance that adequate measures will be instigated to protect the site interest	We are using natural SuDS devices in accordance with the guidance of CIRIA C753 SuDS Manual which is a recognised National approach to ensure sensitivity to ecology and the environment. One of the key features of using SuDS devices are that they bring a flexible approach to runoff management. This would not be possible using traditional hard assets such as pipes, manholes and tanks. The SuDS devices will be fitted with control structures to limit the discharges to those agreed with the stakeholders. Where suitable, the surfaces of the catchments are proposed to be permeable, so surface water will infiltrate to ground in the first instance. Any runoff that does not infiltrate directly will be captured through swales that border each catchment. The swales provide local source control to ensure the management of water returning to the ground to mimic the existing condition. The swales contain an infiltration trench beneath them which will encourage further infiltration, as well as provide additional storage. Any water that does not infiltrate through the infiltration trench into the surrounding ground will be captured by a perforated pipe within the trench, which will convey the flow to a Water Management Zone (WMZ)

Para	Question / Comment from RSPB and SWT (Section 2 of REP3-074)	SZC Co.'s Response
		infiltration basin. The optimum arrangement and balance of individual SuDS features is subject to detailed design. The Water Management Zones basic design is summarised in **Appendix D** to **SZC Co. Comments on Submissions from Earlier Deadlines** [REP5-120].
2.17	Paragraph 3.2.7 (page 28) refers to the inclusion of water level control structures along the realigned Sizewell Drain and the revised operation of other existing structures. see Chapter 19, Volume 2 of this ES [APP-297] for further details. But please note, as set out in our Written Representation13, this avoids a description of this water level control structure in any significant detail, despite this being requested by ourselves, ExA and others for a considerable period of time	The outline options for the control structure proposed for the downstream end of the realigned Sizewell Drain are described in **Appendix C** to **SZC Co. Comments on Submissions from Earlier Deadlines** [REP5-120].
2.18	In paragraph 3.3.4 (page 30) the Applicant states that: 'Intercepting the first 5mm of every rain storm has positive benefits for water quality and quantity, as such, interception will be implemented into the drainage approach wherever practicable	No response required.
2.19	It is our understanding that this is an approach to containing contaminating pollutants, so we do not believe that 'wherever practicable' is acceptable given	As clearly set out in the **Outline Drainage Strategy** [REP2-033], treatment is a guiding tenet of SZC Co.'s approach and a requirement throughout the proposed approach and subsequent

Para	Question / Comment from RSPB and SWT (Section 2 of REP3-074)	SZC Co.'s Response
	the potential risks to water quality on adjacent protected wildlife sites.	design stages. To this end it is our intent to capture the first 5mm of every rain storm, as one part of a wider treatment approach. If there exists a condition where it is simply impractical to do this then alternative anti-contaminant/pollutant measures would be put in place to compensate.
2.20	In paragraph 3.3.7 (page 30) the Applicant states that: 'For facilities that would be served by a direct drainage connection into the existing network, there will be no increase in flow rates or volumes compared to the existing conditions at the site. This will require formal confirmation with respect to the viability (condition and performance) of the existing drainage network. Assurance will be required that there is sufficient capacity to accommodate the anticipated surface water such that there is no increased risk of surface flooding.'	No response required.
2.21	We await the formal confirmation to establish whether this approach is viable.	The flood risk to the project has been assessed within the **Main Development Site Flood Risk Assessment** [AS-018] **and Flood Risk Assessment Addendum** [AS-157]. This work has demonstrated the insignificant risk in relation to the impact on watercourses.
2.22	In paragraph 3.3.16 (page 31) the Applicant states that: 'In addition to managing the 30-year event the strategy considers the site resilience to extreme rainfall	No response required.

Para	Question / Comment from RSPB and SWT (Section 2 of REP3-074)	SZC Co.'s Response
	such as 100-year event and where the runoff will end up ensuring that the surrounding Sizewell Marshes SSSI and Minsmere Nature Reserve are not adversely affected.'	
2.23	As per comments relating to 2.3.3 (page 14) and 2.3.9 (page 15) above, we have yet to see the detail to confirm that the SSSI and Minsmere (which forms part of the Minsmere to Walberswick SPA, SAC, Ramsar and SSSI) are not adversely affected.	Please refer to SZC Co. response to 2.12 in relation to supplementary drainage technical notes and demonstrating how extreme events are managed.
2.24	In paragraph 3.4.5 (page 32) the Applicant states that: 'Surface water from the TCA would be collected, attenuated and discharged to ground or local watercourses under normal conditions. However, whilst the CDO is under construction, if the site is subject to an extreme storm or the receiving watercourses locally are inundated with surface water due to external factors, the TMO could be used to discharge surface water to sea. This offers additional protection to the Sizewell Marshes SSSI and Minsmere South Levels from excess volumes. Further details of the TMO can be found at paragraph 3.4.66.'	No response required.

Para	Question / Comment from RSPB and SWT (Section 2 of REP3-074)	SZC Co.'s Response
2.25	This would be welcome, but we note that this is described as a potential rather than confirmed action and would request that greater clarity of the intended approach is provided.	Further information on the intended use of the temporary marine outfall is set out in **Appendix E** to **SZC Co. Comments on Submissions from Earlier Deadlines** [REP5-120].
2.26	In paragraph 3.4.60 (page 57) the Applicant states that 'surface water from events greater than 1 in 100-year event shall be treated where practicable'. This appears to introduce the potential for untreated pollutants to be discharged in extreme weather events which we do not consider acceptable	To provide context, the "1 in 100 year" event is an event of a magnitude which has a 1% probability of occurring in any given year. This is, therefore, an extreme and rare event. The limitation on discharge is to retain all surface water on site up to a 100 year event, but also including for a further climate change allowance (to allow for anticipated changes in the peak rainfall intensity). This approach is conservative and exceeds the usual performance criteria of such drainage systems for construction and operational sites. If this event was exceeded a level of treatment would continue through the attenuation/treatment features, although this would exceed the design parameters. Nevertheless, the quality and quantity of the discharge would remain subject to the conditions set by the governing discharge permit. The discharge via the TMO will be subject to a permit application which would be granted by the Environment Agency in consultation with stakeholders including the RSPB.
2.27	In paragraph 3.4.61 (page 57) the Applicant states that 'Parts of the area of WMZ-8 drain naturally to the marshes and this will be managed to help the existing	Proposals for the drainage of the western flank of the MCA into the realigned Sizewell Drain are currently under development. They have been shared in concept with the Environment Agency, East

Para	Question / Comment from RSPB and SWT (Section 2 of REP3-074)	SZC Co.'s Response
	water balance of the natural environment'. This relates to the cut-off wall and neighbouring Sizewell Marshes SSSI and we require further information of how the existing water balance will be calculated and drainage appropriately managed.	Suffolk Internal Drainage Board and Suffolk County Council in a meeting of 20 June 2021. SZC Co. will continue to develop the design concept for wider consultation. In accordance with the assessment set out in **Volume 2, Chapter 19 of the Environmental Statement** [APP-297], it is concluded that there is no significant impact on surface water and groundwater and thus no mitigation is required. Nevertheless, the design concept offers a potential opportunity to better mimic the existing baseline conditions with respect to infiltration and flow into the eastern bank of the Sizewell Drain at this location.
2.28	Paragraph 3.4.64 (page 59) the Applicant states that 'Although it is not intended to discharge surface water runoff from the TCA into the CDO, this would be possible if problems arose during the construction phase to reduce flood risk and allow operations to continue'. This implies there is some doubt about managing problems and flood risk from the TCA in the absence of the CDO. Given there will be a period when the CDO is not available could this compound flood risks?	There is no uncertainty surrounding the management of surface water and flood risk on the site. The proposed use of the CDO provides a redundancy in unforeseen or extreme storms beyond design conditions. For the period when the CDO is not present the TMO would be used.
2.29	Paragraph 3.4.7 and plate 3.4 (page 33) refer to Water Management Zone 1 (WMZ-1): this appears to be the old footprint and we have had re-assurance from the	Please refer to **Appendix D** to **SZC Co. Comments on Submissions from Earlier Deadlines** [REP5-120], which includes an updated plan of the WMZ1 basin.

Para	Question / Comment from RSPB and SWT (Section 2 of REP3-074)	SZC Co.'s Response
	Applicant that the design will now avoid the rabbit warren, that is used by natterjack toads. Please can the Applicant confirm that these plans presented here are the old plans and there is no risk to the loss of the rabbit warren.	
2.30	Paragraph 3.4.55 and plate 3.16 (pages 54-55) refer to infiltration trenches. Plate 3.16 shows an infiltration trench running along the northern edge of Ash Wood: what impact is this likely to have on the health of the trees and the risk of drying out the edge of the wood? There is risk this may then impact on the ambient humidity, negatively impacting on the barbastelle roosts	The layouts shown in the ODS are indicative and predominantly show the types and methodologies of the structures that will be used. The specific siting of such features, where the potential for an environmental impact to take place, would be subject to the **Code of Construction Practice** [REP5-078], which in turn is informed by the ecological assessment provided as **Volume 2, Chapter 14 of the Environmental Statement** [AS-033].
2.31	In paragraph 3.6.15 (page 71) we note the consideration of discharging treated foul water into the Leiston Drain from the Land East of Eastlands Industrial Estate and note that the Leiston Drain discharges from this site through Sizewell Marshes SSSI and into the Walberswick – Minsmere SAC, SPA, Ramsar and SSSI so this would introduces a new route for potential pollutants to be introduced into these designated sites.	Only water of sufficient quality will be discharged and would be governed under the appropriate permitting regime, including conditions setting out minimum quality standards.

Para	Question / Comment from RSPB and SWT (Section 2 of REP3-074)	SZC Co.'s Response
2.32	In conclusion, we do not believe that the concern raised in our Written Representation14 para 3.226, that further details of the proposed mitigation to ensure that potential effects on hydrology on the neighbouring Sizewell Marshes SSSI and Minsmere to Walberswick SPA, SAC, Ramsar and SSSI are assessed appropriately has been addressed by the applicant's submission and more detail is required before these concerns can be resolved.	In seeking to address the RSPB and SWT's written representation para 3.226, that further details are provided, we will endeavour to provide reassurances as the design is developed and further detail becomes available. Specifically we refer the RSPB and SWT to **Appendices B - H** to **SZC Co. Comments on Submissions from Earlier Deadlines** [REP5-120] for further information and assurance.

APPENDIX I: ACOUSTIC FENCING ASSESSMENT

CONTENTS

1 INTRODUCTION

1.1.1 In the Initial Statement of Common Ground (SoCG) with Network Rail submitted at Deadline 2 [REP2-074], paragraph 6.3 states that there have been discussions with SZC Co. regarding the potential for acoustic fencing on Network Rail land, adjacent to the railway. Network Rail would not support such fencing if it was to be at their cost. Therefore, the SOCG states:

"Subject to feasibility analysis such fencing could be supported if costs relating to analysis, construction, maintenance and (if required) removal of the fencing were met by the Applicant."

1.1.2 It is important to state, however, that any proposals for acoustic fencing on Network Rail operational land cannot be assumed to be acceptable or deliverable without further detailed engagement with Network Rail.

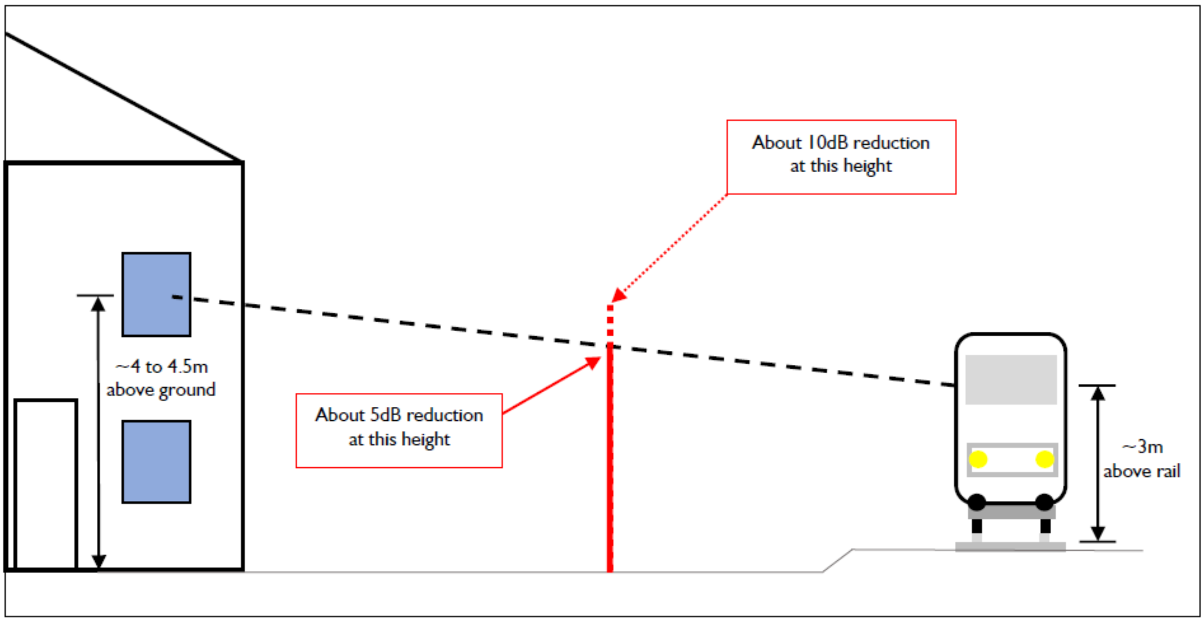
1.1.3 SZC Co. has identified several locations in Woodbridge, Campsea Ashe and Saxmundham where acoustic fencing could potentially be considered to be of benefit in reducing noise to residential receptors. This paper provides a desk-based assessment of these locations and considers whether acoustic fencing in these locations could be considered appropriate in planning terms.

2 BACKGROUND

2.1.1 As a general rule of thumb, acoustic fencing of sufficient density that breaks a line between the source and the receptor will give a reduction of about 5dB. Taller still, and it could deliver a reduction of around 10dB. The principal consideration that has been given to any proposed acoustic fence would be to limit night-time noise from trains and, in this context, the majority of residential receptors of interest would be bedrooms at first floor level.

2.1.2 Surveys undertaken in August 2020 suggested that the effective source height for a locomotive not running at full power would be mid-way up the side of the locomotive. Therefore, an acoustic barrier would need to be 4 to 4.5m high to be sufficient to break the line between the source and a first floor lineside receptor, to give a reduction of at least 5dB. **Plate 2.1** provides an illustration to demonstrate this.

Plate 2.1: Illustration demonstrating the height of acoustic fencing required to mitigate rail noise (locomotive not on full power



2.1.3 When the locomotive is running at full power, the effective source height is at the exhaust, which is approximately 4m above rail level and an effective barrier would need to be correspondingly taller.

2.1.4 The potential locations assessed below, are based on best estimates of where acoustic fencing may be useful in limiting rail noise to receptors overnight, where residential receptors are in close proximity to the rail track. They are not based on modelled outputs but give an indication of the locations most likely to benefit from a reduction in noise impacts.

3 VISUAL ASSESSMENT OF POTENTIAL LOCATIONS

3.1 Woodbridge (central)

3.1.1 **Plate 3.1** shows the illustrative locations of acoustic fencing along the railway line in central Woodbridge.

Plate 3.1: Illustrative acoustic fencing locations – central Woodbridge

3.1.2 The majority of central Woodbridge falls within a conservation area, although the conservation area boundary excludes an area to the north-west of the marina, south of Elmhurst Park (see the non-shaded area on **Plate 3.2**). However, all of the land along the south side of the railway line (east of Woodbridge Station), and the majority to the north, is included in the conservation area.

Plate 3.2: Woodbridge conservation area boundary (eastern edge) – light blue line and shading indicates extent of the conservation area

3.1.3 The Woodbridge Conservation Area Appraisal Supplementary Planning Document (July 2011) describes the riverside area as being: *"…characterised by long and open views with mud, water and boat sheds/yards."* The appraisal describes the riverside as having two medieval maritime centres; the area around the Tide Mill and its quay, and the area around Lime Kiln Quay to the north, both of which are included in the conservation area. It adds:

> *"The arrival of the railway line in 1859 severed the riverside, medieval quays, and later warehouses and boatyards from the town to the west. This physical separation was reinforced by the construction of the relief road (Quayside and Station Road) and the*

redevelopment of large areas of land between the railway line and Station Road for the swimming pool and car park…. However, despite this segregation, the riverside area continues to enjoy a relationship with the town, particularly in terms of the recreational role it affords, and also in the context of long views between the two areas. …

"The area has long formed the foreground to the town, and there is an aesthetic simplicity to the area; little feels contrived, and it retains the feeling of almost organic development."

3.1.4 Policy SCLP11.5 (Conservation Areas) of the Suffolk Coastal Local Plan 2020 states that development within, or which has potential to affect the setting of, Conservation Areas will be assessed against the relevant Conservation Area Appraisals and should:

- demonstrate a clear understanding of the significance of the conservation area alongside an assessment of the potential impact of the proposal on that significance;
- preserve or enhance the character or appearance of the conservation area;
- be of an appropriate design, scale, form, height, massing and position;
- retain features important to settlement form and pattern such as open spaces, plot divisions, position of dwellings, hierarchy of routes, hierarchy of buildings, and their uses, boundary treatments and gardens; and
- use high quality materials and methods of construction which complement the character of the area.

3.1.5 Whilst a section of the potential acoustic fencing (central section in **Plate 3.1**) falls outside of the conservation area, behind the buildings fronting the B1438 (Quayside) opposite the junction with Hamblin Road, the remainder would be within the conservation area.

3.1.6 Within the conservation area, the rail corridor is predominantly flanked by trees and industrial or ancillary buildings (see **Plate 3.3**), against the backdrop of which modest height acoustic fencing may not be considered unacceptable. However, at an estimated 4-4.5m in height, the potential acoustic fencing would be a substantial addition to the rail corridor which would substantially block views and would not be in keeping within the wider context of the conservation area.

Plate 3.3: Google Earth image of rail line looking north from Woodbridge Station

3.1.7 Acoustic fencing of this height would appear incongruous and visually overbearing from both views along the rail line where there are crossings over the tracks and from the B1438 (Quayside) and Tide Mill Way, particularly where it would exceed the height of the adjacent garages and fencing. Any acoustic fencing would also appear incongruous from the residential properties with views towards and across the railway line.

3.1.8 Moving further north, the separation between the railway line and the quayside becomes more open, with less development in the area. As **Plate 3.4** shows, the rail line and the marina are much more prominent for longer views, and the presence of acoustic fencing up to 4.5m high in this area would be detrimental to these views from the wider conservation area, and would appear overbearing from the street.

3.1.9 Furthermore, the addition of tall, acoustic fences in the area would introduce harsh and incongruous features in an area characterised by a strong sense of historic, organic development. This would conflict with the assessment of the area in the Woodbridge Conservation Area Appraisal, which notes the openness of views and the importance of the visual relationship with the riverside. Tall fences would neither preserve or enhance the character and appearance of the conservation area, nor be of an appropriate design, scale, form, height, massing and position, contrary to Policy SCLP11.5.

Plate 3.4: Google Earth view from the conservation area toward the marina and rail line to the east

3.2 Deben Road, Woodbridge

3.2.1 **Plate 3.5** shows the illustrative location of an acoustic barrier to the western side of the railway line further to the north, alongside Deben Road. This location falls just outside of the conservation area boundary.

Plate 3.5: Illustrative acoustic fencing locations – Deben Road, Woodbridge

3.2.2 Although not in the conservation area, the outlook from Deben Road is largely open with just a chain link fence separating the road from the railway line. The River Deben can be seen through views over the railway line, as shown in **Plate 4.2**, and would be more prominent from the first floor windows facing towards the railway line and river.

Plate 3.6: Google Street View image of the River Deben from Deben Road

3.2.3 Seven properties have views towards the railway line and beyond, and the introduction of an acoustic fence up to 4.5m in height would be visually intrusive and incongruous in the area.

3.2.4 From the east-facing first floor windows of 49 Deben Road (seen on the left in **Plate 3.6**), the fence would be in relatively close proximity to the house, not only obscuring views of the river from the first floor windows of the property – resulting in an unduly prominent and overbearing appearance – but also a detrimental impact on the available day and sun light to the east-facing ground floor rooms of the house due to the height of the fence and its proximity. Any benefit in terms of limiting rail noise would be offset by the harm to the amenity and enjoyment of the property by its residents.

3.2.5 Elsewhere on Deben Road, where it runs parallel to the railway line, the wider views of the River Deben would be obscured by the acoustic fencing, resulting in harm to the amenity of the properties by reason of an unduly prominent and overbearing appearance. The properties on this stretch of Deben Road would be set further away from the acoustic fence such that there would be no loss of daylight or sunlight but the acoustic fence would be immediately adjacent to the road side and would have a harsh appearance and overbearing impact in the street scene to the detriment of the character of the area.

3.3 New Quay Court, Melton, Woodbridge

3.3.1 **Plate 3.7** shows the illustrative location of an acoustic barrier to the western side of the railway line further to the north. It is close to the residential development of New Quay Court which includes blocks of flats between three and five storeys facing towards the railway line. This development includes external balconies and outdoor amenity space close to the railway line. To the north is Deben Mill business area. This location falls just outside of the conservation area boundary.

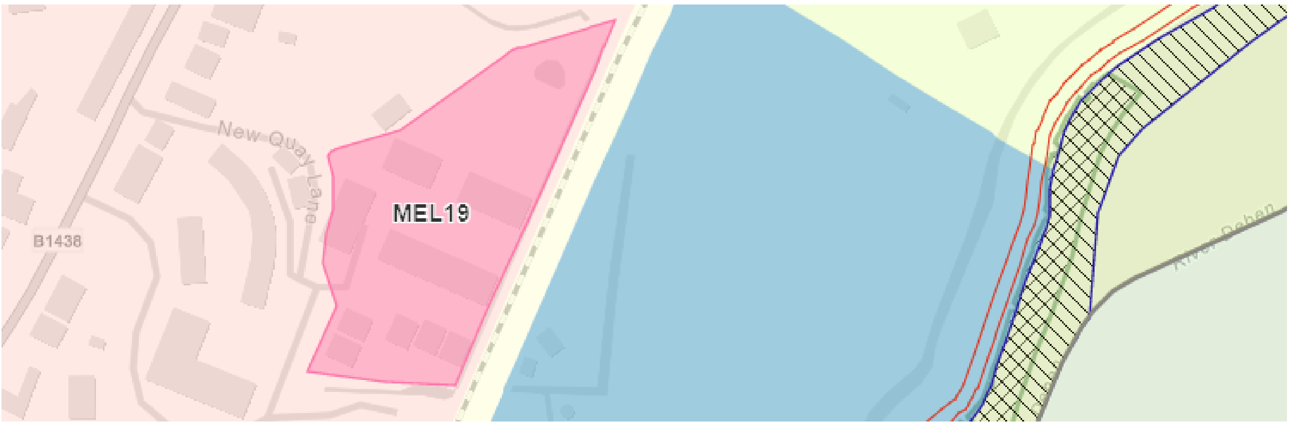
3.3.2 An acoustic fence in this location would need to be higher than 4.5m in order to provide mitigation for the third-storey receptors close to the railway line.

Plate 3.7: Illustrative acoustic fencing locations - New Quay, Woodbridge

3.3.3 **Plate 3.8** shows an extract from the ESC Proposals Map 2021. The potential location for the acoustic fencing falls within the Melton Riverside

Character Area, through which the railway line runs, between the Riverside Qualities Retention Area (blue area) and the Melton Road Character Area (light pink area) including Deben Mill employment area (dark pink area). All of the land to the east of the railway line falls within an Area of Outstanding Natural Beauty (AONB) (green area).

Plate 3.8: ESC Proposals Map 2021



3.3.4 Policy MEL17 (Character Areas) of the Melton Neighbourhood Plan 2016-2030 requires proposals to demonstrate how they contribute positively to the features of the respective character areas, as described in the Melton Character Area Assessment 2016. The Melton Riverside Character Area is bounded by the railway to the west and the River Deben (midpoint of the river) to the east. It also borders Woodbridge to the south and Wilford Bridge to the north. The Riverside Character Area takes its character not only from the river and riverside buildings (there are panoramic views across the river to Sutton Hoo), but also from its setting, including attractive marshland lying between the river wall and the railway line.

3.3.5 Whilst falling within the Melton Riverside Character Area, the indicative location of acoustic fencing would be to the west of the railway line to mitigate noise affecting properties in the Melton Road Character Area. The area is made up of mainly residential buildings, with pockets of commercial/industrial units. There are views of the River Deben from many of the properties on the east side of Melton Hill as the land falls away towards the railway line and the River Deben.

Plate 3.9: Google Earth Image looking out from the business centre

3.3.6 **Plate 3.9** shows the three-storey residential block of flats on the right and the Deben Mill business area on the left in relation to the railway line and Melton Riverside Character Area beyond (including the AONB). The business area would not require screening from an acoustic fence as there are no residential receptors and the proposed rail movements would fall outside of workday hours. However, the flats have views towards the railway line and the Riverside Character Area, which would be severely impacted by the introduction of an acoustic fence in this case in excess of 4.5m in height.

3.3.7 An acoustic fence in this location would be unduly prominent, overbearing and likely to have a detrimental impact on the outlook of the flats and associated outdoor amenity spaces (including balconies), particularly as it would need to be higher than 4.5m to mitigate rail noise effects to the third floor receptors. In addition, the views from the Riverside Character Area and AONB are likely to be negatively affected by the backdrop created by an acoustic fence of significant height when looking west. The harm to the amenity of the flats and the character of the surrounding area would be such that the benefits of the additional rail noise mitigation would be clearly outweighed.

3.4 Riverview, Melton Village, Woodbridge

3.4.1 **Plate 3.10** shows the potential location for an acoustic barrier to the western side of the railway line further to the north, directly adjacent Melton Boat Yard. As with New Quay Court in Melton, the indicative location of the acoustic fencing is adjacent to the Melton Riverside Character Area to the east. To the west is the Melton Village Character Area.

Plate 3.10: Illustrative location of acoustic fencing – Riverview, Melton Village, Woodbridge

3.4.2 The acoustic fencing would stand between the houses along Riverview to the west and Melton Boatyard to the east. The houses in Riverview are bungalows and as such, it may be that acoustic fencing of a lower height would be feasible in this location but views of the fencing would be prominent at the northern end where the railway line crosses Dock Lane and from the boatyard to the east. There is a view through the boatyard to the river beyond from the level crossing (see **Plate 3.11**).

Plate 3.11: Google Street View image from the Dock Lane level crossing

3.4.3 The properties on Riverview benefit from natural screening to the railway line, with mature trees along the boundary allowing glimpses towards the river, including masts of the boats harboured in the boatyard.

3.4.4 The properties on Riverview backing onto the railway line, benefit from this screening to the railway line but the introduction of a substantial acoustic fence would be visually intrusive and incongruous when the vegetation is less dense or not in season. Even with a shorter length of fence, the views towards the boatyard and river from the two storey properties facing east on Riverview (see **Plate 3.12**) would be negatively affected.

Plate 3.12: Google Earth view of Riverview looking east towards the boatyard and River Deben

3.4.5 To the south, the properties on Fayrefield Road are two to three storeys and would require a fence in excess of 4.5m in height (see **Plate 3.13**).

Plate 3.13: Google Earth view of the Fayrefield Road properties overlooking the railway line

3.4.6 The views of the River Deben over the railway line from the Fayrefield Road properties are substantially more open than from Riverview and the introduction of an acoustic fence in excess of 4.5m would be detrimental to the outlook and amenity of these properties. Therefore, it is not considered that the benefits of additional rail noise mitigation would outweigh the harm to the amenity of these properties or to the overall character of the area.

3.5 Campsea Ashe

3.5.1 **Plate 3.14** shows the illustrative location of an acoustic fence on the western side of the railway line in Campsea Ashe, south of Wickham Market station. This location falls on the edge of the Campsea Ashe settlement boundary of the Suffolk Coastal Local Plan 2020. The main part of Campsea Ashe is located to the west of the railway line, with fields and more dispersed buildings to the east, which fall outside of the settlement limits.

Plate 3.14: Illustrative noise barrier locations, Campsea Ashe

3.5.2 Several houses are in close proximity of the railway line in the Little Horsey Park development and along Ullswater Road, Chantry Close and Mill Lane. **Plates 3.15** and **3.16** show typical views towards the railway line from the public domain.

Plate 3.15: Google Street View image from Ullswater Road looking towards the railway line

Plate 3.16: Google Street View image from Chantry Close looking towards the railway line

3.5.3 The surrounding landscape is characterised by areas of woodland and arable fields, existing hedgerows and trees. The introduction of an acoustic fence up to 4.5m in height would be visually intrusive within this rural backdrop and would not reflect the character of the area. Whilst an acoustic fence may be obscured in part by the existing vegetation, its length and height would make it unduly prominent from a number of positions and the first floor windows in particular of the nearest houses. It would be a harsh and incongruous barrier separating the open countryside from the settlement area of Campsea Ashe, which would be detrimental to the outlook and amenity of the houses and the character of this rural village.

3.6 Whitearch Park, south of Saxmundham

3.6.1 **Plate 3.17** shows the illustrative location of an acoustic barrier to the western side of the railway line, adjacent to Whitearch Park, Residential Park Homes. This location is south of Saxmundham and falls outside of the Benhall settlement boundary in the open countryside.

3.6.2 To the west of Whitearch Park, on the opposite side of the A12, lies Benhall Lodge Park, a historic parkland which has been identified as being of plan area wide significance. It is a Non-Designated Heritage Asset.

Plate 3.17: Illustrative acoustic fence location adjacent to Whitearch Park

3.6.3 There is a good level of vegetation and tree planting to the east of the park homes which provide separation and screening from the railway line. In this location, the railway line is on embankment for a large part of its boundary with Whitearch Park. Placing tall fencing on top of the embankment at the southern end of Whitearch Park would exacerbate its height which would likely have a detrimental impact on the outlook and openness of the park.

3.6.4 The alternative of positioning the fencing on lower land and not on the embankment would result in a lower height and appearance but it would be ineffective at breaking the line from the source of the rail noise to the park homes.

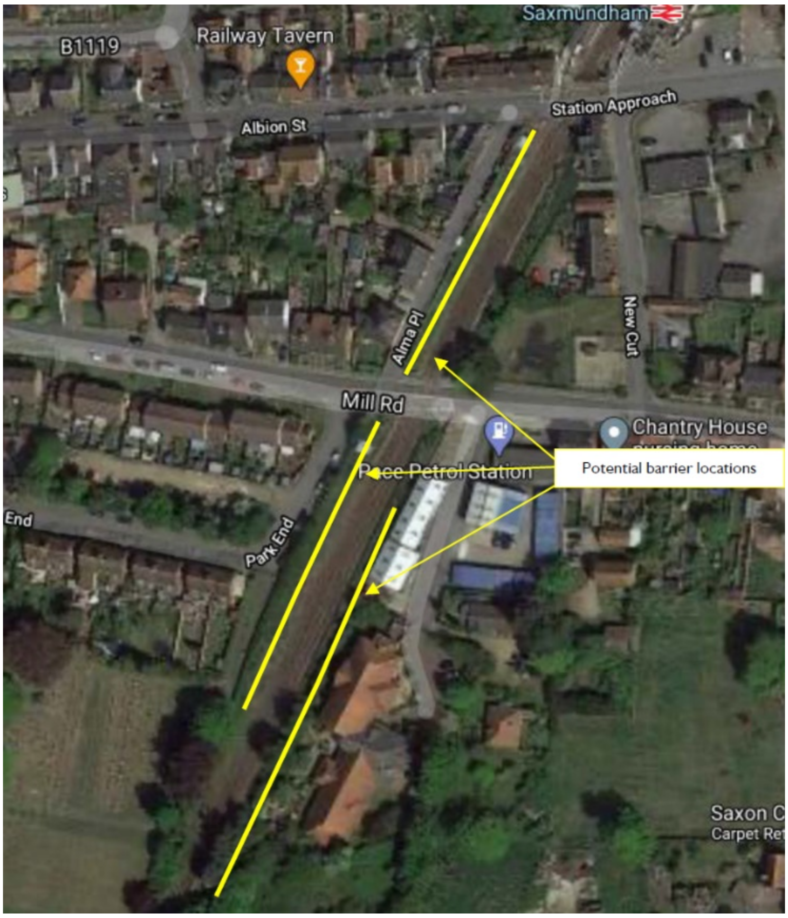
3.6.5 From approximately the mid-point of the eastern boundary of Whitearch Park, the railway drops below the ground level of Whitearch Park and passes into a cutting at the northern end of the site. At this location, the illustrative fencing location is at the top of the railway cutting.

3.6.6 The potential erection of an acoustic fence in this location is currently subject to a targeted consultation exercise with the occupants and owners of Whitearch Park. Given the potential prominence of an acoustic fence in this rural location, any detailed proposals will need to be subject to further assessment, particularly in terms of visual and landscaping impacts.

3.7 Saxmundham (south)

3.7.1 **Plate 3.18** shows the illustrative location of an acoustic barrier to the eastern and western side of the railway line, along Alma Place and Park End, south of Station Approach / Albion Street and Mill Road respectively. In the area immediately south of Station Approach / Albion Street, the acoustic fence would fall within the Saxmundham Conservation Area. The conservation area extends south, centred on the B1121to the east of the railway line. The buildings in this location add to the historic character of the conservation area.

Plate 3.18: Illustrative acoustic fence location at Saxmundham (South)



3.7.2 The introduction of 4-4.5m high acoustic fencing in the town of Saxmundham, and partly falling within and in close proximity to a conservation area, would be highly visible and unduly prominent, whether viewed from the level crossings which cross the railway line or from properties close to the line.

3.7.3 **Plates 3.19** and **3.20** show the views south from the Station Approach and Mill Road level crossings respectively.

Plate 3.19: Google Street View image from Station Approach / Albion Street looking south

Plate 3.20: Google Street View image from Mill Road looking south

3.7.4 In terms of residential amenity, the houses on Alma Place would be most affected, being in close proximity of the indicative fencing with the top of the fencing being opposite the first floor windows (see **Plate 3.21**). The fencing may also need to be higher than 4.5m here to break the line between any second floor receptor windows and the source of the rail noise.

3.7.5 The fencing would not only affect the outlook of the houses and appearing overbearing, but would also have a detrimental impact on the available day and sun light to the ground floor rooms of the houses in particular.

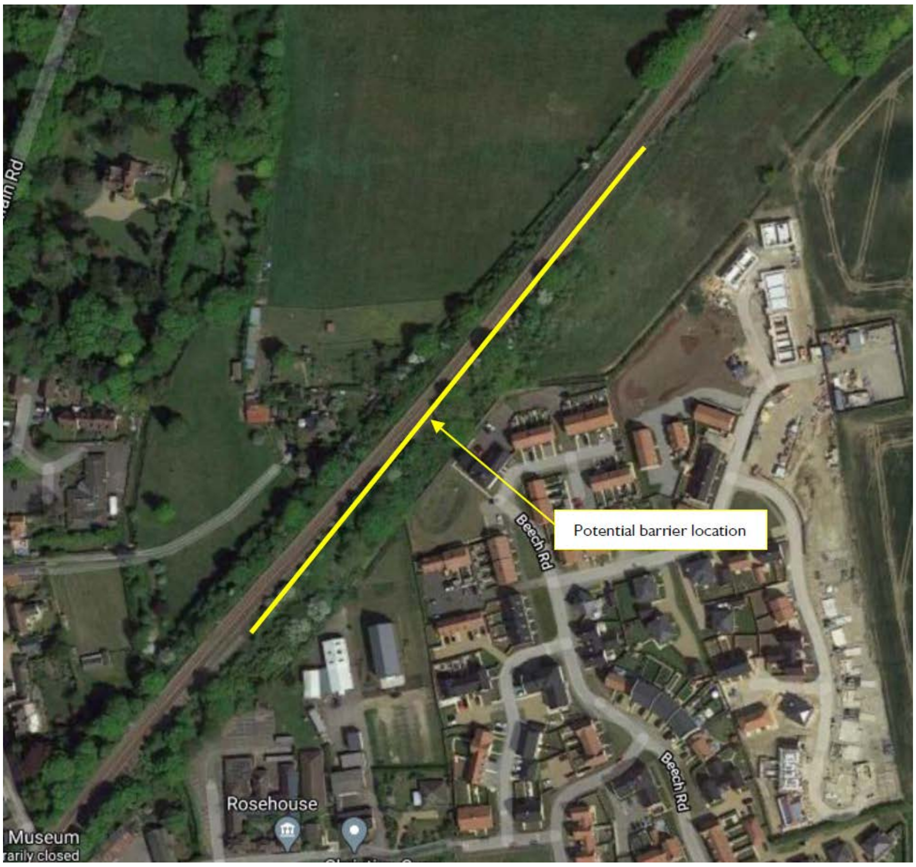
Plate 3.21: Google Street View image showing the proximity of the Alma Place properties to the railway line

3.7.6 Acoustic fences in the area would introduce harsh features through Saxmundham which may block views to listed buildings and would neither preserve or enhance the character and appearance of the area. The fencing would not be of an appropriate design, scale, form, height, mass and position, contrary Policy SCLP11.4 of the Suffolk Coastal Local Plan which seeks to protect listed buildings and their settings.

3.8 Saxmundham (north)

3.8.1 **Plate 3.22** shows the illustrative location of acoustic fencing to the eastern side of the railway line, just outside of the Saxmundham Settlement Boundary, Conservation Area and Town Centre Area. Despite its close proximity to the town centre, the fencing itself would fall in the countryside.

Plate 3.22: Illustrative location of acoustic fence at Saxmundham (north)



3.8.2 To the east of the proposed acoustic boundary, a parcel of land has been allocated for housing at land north-east of Street Farm, with the construction of the allocation for approximately 40 residential units having been commenced. Further north, Carlton Park is located to the north of Saxmundham. It is designated as a park of Historic or Landscape Interest.

3.8.3 Again this area is part of the countryside. There is some natural screening between the railway line and the properties (both existing and under construction) but the introduction of a 4-4.5m high acoustic fence in this area would introduce harsh feature in the countryside at a height and length that would appear unduly prominent and incongruous (see **Plate 3.23**). It may also have a detrimental impact on wider views towards and out of the historic Carlton Park and the Saxmundham conservation area. The introduction of acoustic fencing would therefore fail to preserve or enhance the character and appearance of the area.

Plate 3.23: Google Earth image of the railway line north of Saxmundham and the residential development beyond

4 CONCLUSION

4.1.1 The locations assessed by SZC Co. where acoustic fencing could be considered to be of benefit in reducing noise to residential receptors all have constraints or are sensitive in terms of their relationship with Conservation Areas and Listed Buildings, and/or riverside and countryside locations. In Saxmundham, Woodbridge and Campsea Ashe there would also be detrimental impacts on the outlook and amenity of residential properties in close proximity to the potential acoustic fencing locations.

4.1.2 Given the lengths and heights required for the fencing, the impacts on the character and amenity of these areas would not be outweighed by the benefit of reducing rail noise. Therefore, all except one of the locations assessed are considered to be inappropriate for the positioning of acoustic fencing. The one exception is adjacent to Whitearch Park, south of Saxmundham, and any detailed barrier proposals in that location will require further assessment of potential visual and landscape impacts.

APPENDIX J: MAIN DEVELOPMENT SITE MYCOLOGICAL DESK STUDY

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1 INTRODUCTION

1.1 Aims of the Study

1.1.1 The principal aim of this study was to gather data on fungi recorded from within the main development site and to highlight protected or notable species recorded.

1.1.2 The main development site comprises a wide range of habitats ranging from coastal shingle and sand dunes, alder carr, conifer plantation, dry acid grasslands, with the potential for a wide range of species to be present.

2 METHODS

2.1.1 The following desk-based assessment was carried out with the aim of identifying potential mycological constraints to the Sizewell C development. The assessment was undertaken in accordance with the Chartered Institute of Ecology and Environmental Management (CIEEM) best practice guidelines. A review of the following sources was undertaken:

- Magic Map (Ref 1), to investigate statutory designated sites and priority habitats that may be favourable to fungal species within the red line boundary + 2km.
- Important Fungus Areas report (Ref 2).
- Information from Suffolk Biological Information Services (SBIS), requested in July 2021 for non-statutory designated sites and fungus records within the main development site + 2km.
- SBIS Priority habitats 2015 factsheets (Ref 3).
- Sizewell C Environment Statement, Plants and Habitats Appendix (Ref 4) [APP-229].
- Information from the Suffolk County fungi recorder, N. Mahler from a British Mycological Society (BMS) field trip in 2009 (Ref 5).

2.1.2 The exercise was undertaken to obtain information relating to mycological features; these are statutory and non-statutory designated sites, valuable fungal habitats and species of principle importance, legally protected and controlled species and other conservation notable species that have been recorded over the past 41 years, (i.e., 1980 – 2021).

3 RESULTS

3.1 Designated sites and Important Fungus Areas

3.1.1 No statutory or non-statutory designated sites found within or adjacent to the main development, including Sizewell Marshes SSSI, refer to important fungus communities or species on their citations.

3.1.2 Important Fungus Areas (IFA) were defined by Evans *et al.* (Ref 2) based on the presence of threatened or rare species, richness and the mycological importance of their habitat. These sites have been categorised into four criterion defined below:

3.1.3 **Criterion A** – The site holds significant populations of rare fungal species which are of European or UK conservation concern. A site should be considered if it includes at least five species.

- The provisional UK Red Data List.
- UK biodiversity Action Plan or Schedule 8 of the Wildlife and Countryside Act 1981 (as amended).
- European Red Data List or species of European concern.

3.1.4 **Criterion B** – the site has exceptionally rich and well recorded mycota in a UK context. A site should be considered if it includes at least 500 recorded species.

3.1.5 **Criterion C** – a site which is an outstanding example of a habitat type of known mycological importance.

3.1.6 **Criterion D** - sites which 'mycologists believe to be important but where more information is desirable'.

3.1.7 Suffolk has four IFAs which qualify under criterion A-C. Minsmere (IFA No. 118) is the closest to the main development site (adjacent to the north), has had 1455 species found over time, and qualifies as an IFA under qualifying criteria group A and B. The noted habitats on site description are marshes with carr, scrub, mixed and broadleaved woodland. It also notes that the interest is mainly micro-fungi. The other three sites are located over 15km from the main development site.

3.1.8 There are seven IFAs within Suffolk which qualify under criterion D, the closest one of these is Dunwich Forest 3.7km north of the main development site. Dunwich Forest consists of predominately conifer plantation with areas of lowland mixed deciduous woodland priority habitat.

3.2 Valuable Mycological Habitats

3.2.1 Evans *et al*. (Ref 2) define the following habitats as those with known mycological interest (although not exclusively so); short, open, unfertilised grassland, undisturbed woodland soil, mature trees in grazed parkland and active duneland.

3.2.2 Information from SBIS priority habitat factsheets (Ref 3) suggests that mature trees with an abundance of dead wood found in hedgerows and lowland mixed deciduous woodland provide important fungus habitats within Suffolk. The factsheets also note that the low nutrient status of the summer-parched soils in Suffolk encourages rare fungi such as Nail fungus (*Poronia punctata*) on pony dung and Waxcaps to grow.

3.2.3 The following Priority Habitats were identified within the main development site that are potentially suitable to support interesting fungal communities:

- Lowland mixed deciduous woodland – Located on the Sizewell C platform, and within and adjacent to the SSSI Triangle comprising Alder carr. Some deadwood is present within the SSSI Triangle.
- Reedbed – within the SSSI triangle forming a structurally complex habitat mosaic with the wet woodland and aquatic habitats.
- Lowland fen/coastal and floodplain grazing marsh – Comprising M22 Fen meadow and situated within the red line boundary on the east edge of Sizewell Marshes SSSI.
- Dry Acid Grassland – Areas of the site support a range of dry, often parched swards including; Black Walks which contains acid grassland with scattered scrub subject to rabbit and occasional sheep grazing, Species rich grassland rides running through Goosehill conifer plantation typical of Suffolk Sandlings grassland, and species poor acid grassland within Retsoms field.
- Coastal sand dune and vegetated shingle – This habitat extends in a continuous band running along the coastline, connecting Minsmere European site in the north and Leiston to Aldeburgh SSSI to the south.

3.3 Desk Study Records

3.3.1 A total of 988 fungi records were returned from the Desk Study, which included data for RSPB Minsmere reserve and Dunwich National Trust. This included 416 records of 241 species of non-lichenised fungi, within the 2km of the red line boundary. Records were collated into decades with number of records and species per decade shown in **Table 3.1**.

Table 3.1: Showing number of records and species per decade within the development zone.

1980s	1990s	2000s	2010s	2020s
59 records of 58 species	153 records of 87 species	183 records of 154 species	16 records of 15 species	2 records of 2 species

3.3.2 These species were mostly comprised of common to uncommon species with no protection or recognised conservations status.

3.3.3 Three species of conservation concern and two other notable species were recorded. These species, their conservation status or reason of interest and location found are displayed in **Table 3.2.**

Table 3.2: Important fungal species found within 2km of the redline boundary

Common name	Scientific name	Habitat requirements	Conservation status / reason for interest	Location description and distance to the main development site
Sandy stilt puffball	*Battarrea phalloides*	Preference for sandy soils	Schedule 8 of the Wildlife and Countryside Act 1981 (as amended)[1] Species of Principal Importance under Section 41 of the NERC Act (2006)	In the verge adjacent to the Vulcan Arms pub (2021) 30m south

[1] Species that are legally protected from intentional picking, uprooting or destruction and selling.

Common name	Scientific name	Habitat requirements	Conservation status / reason for interest	Location description and distance to the main development site
Bearded tooth	*Hericium erinaceus*	Relies on old, established woods and grows on beech, oak and birch trees	Schedule 8 of the Wildlife and Countryside Act 1981 (as amended) Species of Principal Importance under Section 41 of the NERC Act (2006)	Minsmere (2001 and 2009) 1.3km north
Tiny earthstar	*Geastrum minimum*	Sandy soil near/on coastal dunes	Vulnerable[2] (UK Red Data List 1992) Species of Principal Importance under Section 41 of the NERC Act (2006) Suffolk Priority Species	Within the sand dunes in front of Sizewell B (2014) 100m south
Wrinkled Peach	*Rhodotus palmatus*	Saprobic on well-rotted hardwood trunks and branches, usually of fallen elms but occasionally on other broadleaf timber.	European Red List 1993 – Group B[3]	Kenton Hills (1994) 100m south

[2] Species likely to become endangered in the near future if the agents of their decline are not removed or reduced.
[3] Widespread losses, evidence of steady decline, some national extinctions, medium-level concern.

Common name	Scientific name	Habitat requirements	Conservation status / reason for interest	Location description and distance to the main development site
A whitewash fungi	*Dendrothele naviculoefibulata*	Woodland	New to the UK	Kenton Hills (2009 and 2011) on two Elms 100m south
A tennis puffball	*Mycenastrum corium*	Solitary, scattered, or in rings, occasionally clustered; fruiting in pastures	Second UK record (the first being from Scotland)	Leiston Common 250m

3.3.4 The four protected species/ species with recognised conservation status are displayed on **Plate 3.1**.

Plate 3.1: Locations of the four fungi species of conservation concern.

3.3.5 In October 2009 the British Mycological Society (BMS) held a Fungus Foray in east Suffolk. They were stationed at Leiston Abbey for the week and explored several sites in the area. Only a single morning was spent in the proposed development area. The following was extracted from the BMS report of that visit.

3.3.6 "*The last day had two main localities. Very close to the Abbey, Kenton Hills is a pleasant walk through a variety of habitats until one emerges at Sizewell B nuclear power station, which always comes as a shock. The woodland rides were lined with fruitbodies. The discovery of Pluteus romellii* *and P. umbrosus augmented the Craft Wood species list for this genus. Dan Dvořák commented that Rhodotus palmatus occurs exclusively on elm in central Europe, whereas here after the Dutch elm disease we are finding it appearing on other hosts such as beech. The rarely seen Leucoagaricus georginae was one of a number of interesting lepiotoids. Martyn Ainsworth and Alan Lucas had success with a variety of resupinates including Dendrothele griseocana and Tubulicium vermiferum both of which were unknown to the Ellises. Dinah Griffin made sure we could all recognise Seifertia azalea (previously Pycnostysanus azalea) on a rogue Rhododendron. Although the number of species, 93, was exceeded elsewhere, this was assuredly one of the most pleasant walks of the whole foray*".

3.3.7 The species recorded within this walkover do not have recognised conservation status, except *R. palmatus*, described in **Table 3.1**.

4 DISCUSSION

4.1.1 The main development site contains a variety of habitats and 241 species were recorded from the desk study within 2km.

4.1.2 Much of the west of the main development site and the south-west corner consists of an arable landscape interspersed with hedgerows. While some of these hedgerows contain mature trees with deadwood, only a small number were considered to be important. It is likely therefore that the mycota associated with the arable habitat on site is likely to be comprised of common species and unlikely to fit the criterion as an IFA.

4.1.3 Habitats within the north and east of the site are more varied and include conifer plantation, broadleaved woodland, wet woodland, acid grassland, reedbed, scrub and coastal dune and shingle. The habitats within Sizewell Marshes SSSI in particular form a complex mosaic containing many niches promoting species diversity potential.

4.1.4 The habitat within the main development site, particularly those associated with Sizewell Marshes SSSI and coastal areas, are contiguous with Minsmere European site which is considered an Important Fungus Area (IFA), due to the fungus diversity and presence of rare species. It is possible that notable fungus species associated with such habitats in Minsmere could be present within the main development site. Bearded tooth, a Schedule 8 species, was recorded in Minsmere. This species is unlikely to be within the main development site as it requires old growth woodland whereas the broadleaved woodland within the main development site is semi-mature or consists of unsuitable Alder carr. The Section 41 species tiny earthstar however, while not recorded within Minsmere, was recorded along the coastal habitats 100m south of the order limits and could be present within the main development site.

4.1.5 Dry acid grassland is present within pockets of the main development site. As described in **Section 3.2**, dry sandy grassland habitats in Suffolk are known to support important fungus species. This is evident in the presence of sandy stilt puffball, a Schedule 8 species, along the road verge adjacent to the entrance of Sizewell estate. Little is known about this species except its liking for sandy soils and that hollow trees and maybe stumps may be important. Due to the proximity of this species to order limits and the presence of potentially suitable habitat within the main development site, absence of this species in the main development site cannot be assumed.

4.1.6 The Goosehill conifer plantation, while not a Priority Habitat, contains open rides with acid Sandlings grassland communities, patches of broadleaved tree and scrub species and a large deadwood (conifer) resource. Kenton

Hills, outside of the order limits, contained wrinkled peach and *D. naviculoefibulata* two notable species. This woodland is similar in habitat and forms part of the same plantation complex as Goosehill, so there is a potential for Goosehill to support similar species.

5 CONCLUSION

5.1.1 The main development site contains multiple habitats that are considered potentially of interest for fungi including the coastal habitats, dry acid grassland, wetland habitats associated with Sizewell Marshes SSSI and Goosehill conifer plantation. Protected and notable species recorded in habitats adjacent to the order limits could potentially be found within the main development site.

5.1.2 A survey will be undertaken in early Autumn 2021 to provide further information to the examination, with a particular focus on the presence of any protected and notable species.

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Ref 5. Suffolk Natural History 2010. Fungi recording in Suffolk, N, Mahler. Vol 46.

Ref 6. Illiffe. R, 2004. guidance notes of collecting and recording. British Mycological Society

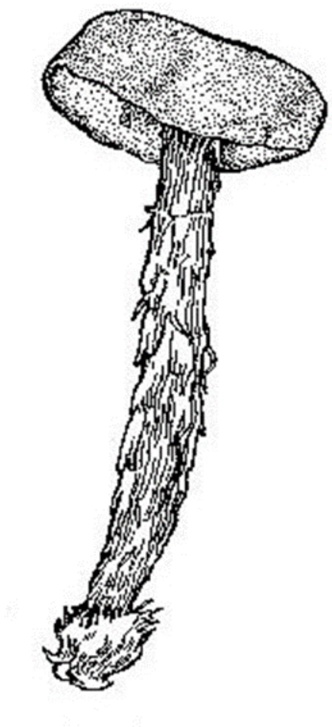
Ref 7. 2018 S, Boscanquet et. al. Guidelines for selection of Biological SSSIs. Part 2: Detailed Guidelines for Habitats and Species Group. Chapter 14 Non-lichenised fungi.

Ref 8. 2010 Mycologist news 102 – The newsletter of the British Mycological Society 2010 (2).

APPENDIX A: FURTHER INFORMATION ON SPECIES OF CONSERVATION CONCERN

A.1. Sandy Stilt Puffball (*Battarraea phalloides*)

A.1.1. *The Sandy Stilt Puffball fungus makes appearances in most years in Suffolk, but these remain the most predictable occurrences of the species in the country. Very little is known about its ecology apart from a liking for sandy soils. Hollow trees and perhaps stumps may also be important.*



A.2. Definition

A.2.1. The Sandy Stilt Puffball (*Battarraea phalloides*) was first described from Britain and has a scattered distribution in western Europe. Although it was formerly known from much further north, its main areas of distribution became confined to sites in southern and eastern Europe.

A.3. Current status: National

A.3.1. The Sandy Stilt Puffball is one of only four fungi listed on Schedule 8 of the Wildlife & Countryside Act, it is also a Red Data Book species. This species has been recorded from a number of counties in southern England but is only reliably known from Suffolk and Norfolk. *Battarraea phalloides* only appears to be known from about 30 UK sites, of which there are 7 in Suffolk. Several specimens are held in the National Collection at Kew, mostly from Kent and Surrey, the latest being found in 1981. Those collected in Buckinghamshire and Gloucestershire are very old, though recent specimens come from Jersey and Norfolk (both 1996) and Oxfordshire (1997). Records exist for Somerset and possibly other southern counties.

A.3.2. Although rare in Europe, it has been recorded from most countries except those in the north, and it is also known from North America.

A.4. Current status: Local

A.4.1. There are seven known sites in Suffolk, (one of which remains confidential). Sandy Stilt Puffball has been noted in the parishes of Blyford, Melton, Campsea Ashe, Marlesford and Reydon. This rare fungus appears to have been seen first in England in 1782 in the area of Earsham and Kirby Cane, in south Norfolk, just north of the town of Bungay (Suffolk) and was formally described in 1785.

A.4.2. The first definite Suffolk record was made by a Mr. Davies of Yoxford, and his specimen was illustrated by Sowerby in 1803 and is included in the National Collection at Kew.

A.4.3. It has appeared at three sites since the last war, principally at Blyford near Halesworth, where over 80 were seen in the mid-1970s. It has appeared in much smaller numbers in most years since then, sometimes in spring as well as summer and autumn. In the period 1984-86 a few fruiting bodies occurred on a hedge bank at Campsea Ashe some 20 miles further south, but none have been recorded at this site since then.

A.4.4. A new location was discovered by D. & C. Orme at Melton, East Suffolk in August 1997, when two large fruiting bodies were noted on a small heap of sand excavated by rabbits under an old oak tree. This verge bank is dry and has little vegetation and faces east.

A.4.5. The Blyford bank faces east and has elm scrub and annual weeds over its 70-metre length. It is backed by a good hedge of Small leaved elm (*Ulmus minor*) for most of its length. The Campsea Ashe bank is less scrubby but has the same elm at various stages from scrubby bushes to quite tall trees. It faces north and supports mainly weed species in its sandy soil.

A.4.6. At neither site has the fungus been seen inside hollow trees, a habitat mentioned in the National Biodiversity Action Plan, although at Blyford in late August 1997 two fruiting bodies appeared close to the base of a large elm which was felled some years earlier.

A.5. Natural Areas

A.5.1. Suffolk Coast & Heaths.

A.6. Current factors causing the loss or decline of the species in Suffolk

A.6.1. Very little is known about this fungus. Of the 7 sites in Suffolk, only the dry sandy soil and possibly the fact they face north or east appear to be common factors.

A.6.2. As it appears rather randomly, it is possible it has always been rare and therefore may not be significantly more threatened now than it was when discovered two centuries ago.

A.7. Current Action: Legal Status

A.7.1. Sandy Stilt Puffball is protected under Schedule 8 of the Wildlife and Countryside Act 1981(as amended).

A.8. Current Action: Management, research and guidance

A.8.1. All sites are monitored fairly regularly to check for fruiting bodies. The Reydon site has recently been involved in a planning enquiry, resulting in houses being built just behind the site. The site owner has volunteered to look after the site as a private nature reserve. The fungus is still present here (2003).

A.8.2. The Blyford site will remain uncut until the winter (2003), when it is hoped local volunteers will remove dead vegetation and prune elm suckers. The fungus has not been seen here for the last couple of years.

A.8.3. The confusion between *B. phalloides* and *B. stevenii* is currently being researched at the University of Kent. This research is funded by English Nature, Kew Gardens and Kent University). It is hoped the research will investigate the genetic diversity of *Battarraea phalloides* and *B. stevenii* at and between distinct sites across their natural range by comparison of specific DNA sequences to clear up uncertainties about their likely taxonomy. Molecular diversity measures should also be used to suggest the relative roles of mycelial growth and spore dispersal in population maintenance and spread.

A.9. Action Plan Objectives and Targets

- Maintain seven known Suffolk sites in favourable condition and ensure adequate protection.
- Monitor all sites for appearance of fruiting bodies.
- Encourage local wildlife recorders to search for the fungus at other suitable sites.

Table 4.1 Sandy Stilt Puffball proposed action with Lead Agencies

Action	Date	Partners
POLICY AND LEGISLATION		
Ensure Sandy Stilt Puffball remains on Schedule 8 of the Wildlife & Countryside Act (1981) and that relevant district councils are aware of its presence.	On-going	**EN**
SITE SAFEGUARD AND MANAGEMENT		
Maintain road verge sites as Roadside Nature Reserves and extend marker posts if the fungus appears again outside the posts.	On-going 2004	**SCC**
Notify all sites as CWS where not already protected as Roadside Verge Reserves.	2006	**SCC, SWT**
RESEARCH AND MONITORING		
Co-ordinate monitoring of all sites on an annual basis	On-going	**SCC**
Disseminate findings of national research into the needs of the fungus and its management to relevant people.	On-going	**EN** (Carl Borges), Kent University.
ADVISORY		
Protect from potential damage by roadworks, soil disturbance and trampling. By advising landowners and SCC Highways staff of its presence.	On-going	**SCC**
COMMUNICATIONS AND PUBLICITY		
Publicise the importance of the sites in local press and county naturalists' journals to increase local awareness and encourage sightings of the fungus.	On-going	**SBRC,** SWT, SCC,

A.10. Tiny Earthstar (Geastrum 'minimum' agg.)

What to Look For

A.10.1. Fruitbody 1.5-3 cm diam. when expanded; endoperidium 6–12(-16) mm diam., pale grey-brown and covered in whitish-grey crystalline pruina when fresh, subglobose; peristome fimbriate/fibrillose, delimited with a weak groove; columella whitish, cylindric/clavate, may be poorly defined; mature gleba brown; pseudoparenchymous layer pale when young, growing darker and splitting with age, may form a collar around the stalk; stalk brown, 1 mm tall; exoperidium splitting into 6-10 arching rays; not fornicate (i.e. the fruitbody is not elevated by arching rays to the extent of separation of its base from the mycelial layer below); mycelial layer persistent and encrusting debris; capillitial hyphae yellow- brown, 3-6 µm diam., thick-walled, tapering towards tips, irregularly encrusted, sometimes forked; spores dark brown, globose, 5-6 µm diam. excluding ornamentation, 5.5-7.5 including; spore ornamentation irregular, composed of coarse verruculae 0.4-0.7 µm tall and 2 µm diam. Fruiting bodies often found in groups.

A.10.2. Members of the *G. minimum* agg. include a number of morphologically similar species, detailed in Zamora et al. (2015). The most likely candidate for the species reported in the UK is G. marginatum Vittad. (Zamora, pers. comm.), although further study is required. Note: description adapted from Pegler et al. (1995) and updated according to Zamora et al. (2015).

A.10.3. Notes: This species was previously known as *G. minimum*, a species concept which has been recently considered too uncertain to use, and has therefore been split. The correct current name for the species recorded in England is uncertain, and any new record conforming to the *G. "minimum"* concept from GB&I would be of interest. Several other similar Geastrum species are also considered rare or vulnerable, and records of these would also be of interest.

When to Look

A.10.4. Most records of this species are from August to December, but records from all seasons exist.

Where to Look

A.10.5. In sandy soil near/on coastal dunes. There is one consistently sampled site in Norfolk (Holkham Meols/Gap), and other reports from similar habitats in Sandscale Haws National Nature Reserve (Westmorland) and Driggs Dunes (Cumberland). Other coastal dune sites may be worth investigating.

Conservation Status

A.10.6. Classed as Vulnerable / D2 in GB&I in the provisional Red Data List of Threatened British Fungi (Evans et al., 2006). Previously a UK BAP priority species.

Associations

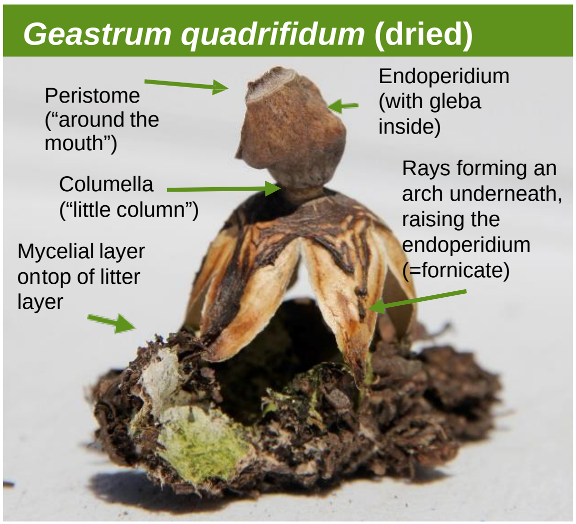
A.10.7. Often found on mosses, with *Pinus nigra*, grasses and sedges.

Look-alikes (in GB&I)

A.10.8. *G. schmidelii* is similar in size and macroscopic appearance and found in similar habitats. It differs in possessing a sulcate peristome (outside of the "mouth" slit clearly marked with parallel grooves) while that of *G. minimum* is fibrillose (covered in minute hairs).


Sulcate peristome of *G. Schmidelii*

A.10.9. *G. quadrifidum* (below) should be clearly distinguishable in possessing a fornicate exoperidium, with (3-)4-5(-6) rays, the margins of rays conspicuously rolled out. A very similar species, *G. britannicum*, has also been recently described in the UK, differing in basidiospore and peristome micromorphology (Zamora et al., 2015). *G. quadrifidum* is currently considered vulnerable (Evans et al. 2006), while *G. britannicum* is known only from three collections.



A.10.10. *G. coronatum* has robust and much larger fruitbodies (3-10 cm when expanded), with a fibrillose peristome, dark stalk and glabrous endoperidial surface, covered with a 'mealy' mesoperidium formed by abundant but rather indistinct hyphae. Basidiospores are also very distinct from *G. minimum*.

Known sites in GB&I

- Sandscale Haws NNR, Westmorland VC:69, England. 2013, coll: D.G. Benham. Grid ref: SD189751.
- Holkham Gap, West Norfolk VC:28, England. Most recently found in 2012, coll.: R. Purser. Grid refs: TF88964499, TF87494555.
- Driggs Dunes, Cumberland VC:70, England. 1999, coll: J. Thomas. Grid Ref: SD0498.

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- For more information, questions, queries or corrections, contact: Dr. Brian Douglas (b.douglas@kew.org), or visit the Lost and Found Fungi project website (http://fungi.myspecies.info/content/lost-found-fungi-project).

A.11. *Dendrothele naviculoefibulata*

A.11.1. ***Dendrothele naviculoefibulata*** is going on the British list thanks to 3 collections (2009 on BMS Autumn Foray and 2011 AMA & NM) from two elms at Kenton Hills, East Suffolk. The details are:

- K(M)168119 collected AMA, det. AMA, 7Nov 2009, on bark of Ulmus at TM45636392.
- K(M) 190408 collected AMA & NM, det. AMA, 8Jan 2011, on bark of Ulmus at TM45636392 (same tree as previous).
- K(M) 190409 collected AMA & NM, det. AMA, 8Jan 2011, on bark of Ulmus at TM456639 (a neighbouring tree wrt the previous).

Tennis ball puffball – *Myceastrum corium*. These three fungi were collected ‘somewhere near Sizewell Belts in 2011’

APPENDIX B: FULL SPECIES LIST

Table 4.2 Full Species List

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
Horse Mushroom	Agaricus arvensis	1998	Aldringham Common and Walks / Thorpeness Golf Course	1998	TM460608
Field Mushroom	Agaricus campestris	1988	Aldringham Common and Walks / Thorpeness Golf Course	1988 - 1997	TM460608
Field Mushroom	Agaricus campestris	2014	Sizewell	16/07/2014	TM4765
Scaly Wood Mushroom	Agaricus langei	1988	Aldringham Common and Walks / Thorpeness Golf Course	1988 - 1997	TM460608
Blushing Wood Mushroom	Agaricus sylvaticus	1998	Aldringham Common and Walks / Thorpeness Golf Course	06/10/1998	TM460608
Yellow Stainer	Agaricus xanthodermus	1998	Aldringham Common and Walks /	September 1998	TM460608

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
			Thorpeness Golf Course		
Dark Fieldcap	Agrocybe erebia	1997	Aldringham Common and Walks / Thorpeness Golf Course	1997	TM460608
Orange Peel Fungus	Aleuria aurantia	1988	Aldringham Common and Walks / Thorpeness Golf Course	1988 - 1997	TM460608
Orange Peel Fungus	Aleuria aurantia	1994	Kenton Hills	08/10/1994	TM460642
Orange Peel Fungus	Aleuria aurantia	1996	Kenton Hills	06/10/1996	TM460642
Orange Peel Fungus	Aleuria aurantia	2014	Sizewell	16/07/2014	TM4663
False Death Cap	Amanita citrina	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
False Death Cap	Amanita citrina	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
Tawny Grisette	Amanita fulva	1997	Aldringham Common and Walks / Thorpeness Golf Course	1997	TM460608
Tawny Grisette	Amanita fulva	1998	Aldringham Common and Walks / Thorpeness Golf Course	1998	TM460608
Fly Agaric	Amanita muscaria	1992	Aldringham Common and Walks / Thorpeness Golf Course	Autumn 1992	TM460608
Fly Agaric	Amanita muscaria	1994	Kenton Hills	08/10/1994	TM460642
Fly Agaric	Amanita muscaria	1997	Kenton Hills	25/10/1997	TM460642
Fly Agaric	Amanita muscaria	1997	Aldringham Common and Walks / Thorpeness Golf Course	1997	TM460608

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
Fly Agaric	Amanita muscaria	1998	Aldringham Common and Walks / Thorpeness Golf Course	1998	TM460608
Fly Agaric	Amanita muscaria	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Fly Agaric	Amanita muscaria	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Death Cap	Amanita phalloides	1994	Kenton Hills	08/10/1994	TM460642
Death Cap	Amanita phalloides	1996	Kenton Hills	06/10/1996	TM460642
Death Cap	Amanita phalloides	1997	Aldringham Common and Walks / Thorpeness Golf Course	1997	TM460608
Death Cap	Amanita phalloides	1998	Aldringham Common and Walks / Thorpeness Golf Course	1998	TM460608

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
Blusher	Amanita rubescens	1994	Kenton Hills	08/10/1994	TM460642
Blusher	Amanita rubescens	1996	Kenton Hills	06/10/1996	TM460642
Blusher	Amanita rubescens	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Blusher	Amanita rubescens	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Honey Fungus	Armillaria mellea	1988	Aldringham Common and Walks / Thorpeness Golf Course	1988 - 1997	TM460608
Honey Fungus	Armillaria mellea	1994	Kenton Hills	08/10/1994	TM460642
Honey Fungus	Armillaria mellea	1996	Kenton Hills	06/10/1996	TM460642
Honey Fungus	Armillaria mellea	1997	Kenton Hills	25/10/1997	TM460642
Moss Oysterling	Arrhenia acerosa	1988	Aldringham Common and Walks / Thorpeness Golf Course	1988 - 1997	TM460608

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
Jelly Ear	Auricularia auricula-judae	1988	Aldringham Common and Walks / Thorpeness Golf Course	1988 - 1997	TM460608
Jelly Ear	Auricularia auricula-judae	1997	Kenton Hills	25/10/1997	TM460642
Jelly Ear	Auricularia auricula-judae	2010	Kenton Hills	24/02/2010	TM4564
Jelly Ear	Auricularia auricula-judae	2014	Sizewell	16/07/2014	TM4663
Earpick Fungus	Auriscalpium vulgare	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Earpick Fungus	Auriscalpium vulgare	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Conifercone Cap	Baeospora myosura	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Conifercone Cap	Baeospora myosura	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Sandy Stilt Puffball	Battarrea phalloides	2021	Sizewell	18/04/2021	TM4735562691

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
Smoky Bracket	Bjerkandera adusta	1997	Kenton Hills	25/10/1997	TM460642
Yellow Fieldcap	Bolbitius titubans var. titubans	1994	Kenton Hills	08/10/1994	TM460642
Bay Bolete	Boletus badius	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Bay Bolete	Boletus badius	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Red Cracking Bolete	Boletus chrysenteron	1994	Kenton Hills	08/10/1994	TM460642
Byssonectria terrestris	Byssonectria terrestris	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Yellow Stagshorn	Calocera viscosa	1994	Kenton Hills	08/10/1994	TM460642
Giant Puffball	Calvatia gigantea	2008	Sizewell	22/07/2008	TM466630
Chanterelle	Cantharellus cibarius	1990	Aldringham Common and Walks / Thorpeness Golf Course	1990	TM460608
Shaggy Parasol	Chlorophyllum rachodes	1988	Aldringham Common and Walks /	1988 - 1997	TM460608

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
			Thorpeness Golf Course		
Shaggy Parasol	Chlorophyllum rachodes	1994	Kenton Hills	08/10/1994	TM460642
Shaggy Parasol	Chlorophyllum rachodes	1996	Kenton Hills	06/10/1996	TM460642
Shaggy Parasol	Chlorophyllum rachodes	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Silver Leaf Disease	Chondrostereum purpureum	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Silver Leaf Disease	Chondrostereum purpureum	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Copper Spike	Chroogomphus rutilus	1998	Aldringham Common and Walks / Thorpeness Golf Course	1998	TM460608
Moor Club	Clavaria argillacea	1983	Sizewell	30/06/1983	TM46R
Meadow Coral	Clavulinopsis corniculata	1997	Aldringham Common and Walks /	1997	TM460608

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
			Thorpeness Golf Course		
Apricot Club	Clavulinopsis luteoalba	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Apricot Club	Clavulinopsis luteoalba	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Ivory Funnel	Clitocybe dealbata	1998	Aldringham Common and Walks / Thorpeness Golf Course	1998	TM460608
Fragrant Funnel	Clitocybe fragrans	1988	Aldringham Common and Walks / Thorpeness Golf Course	1988 - 1997	TM460608
Trooping Funnel	Clitocybe geotropa	1998	Aldringham Common and Walks / Thorpeness Golf Course	02/10/1998	TM460608
Clouded Agaric	Clitocybe nebularis	1994	Kenton Hills	08/10/1994	TM460642

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
Clouded Agaric	Clitocybe nebularis	1996	Kenton Hills	06/10/1996	TM460642
Clouded Agaric	Clitocybe nebularis	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Clouded Agaric	Clitocybe nebularis	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Frosty Funnel	Clitocybe phyllophila	1988	Aldringham Common and Walks / Thorpeness Golf Course	1988 - 1997	TM460608
Cracking Clitocybe	Clitocybe rivulosa	1997	Aldringham Common and Walks / Thorpeness Golf Course	1997	TM460608
Miller	Clitopilus prunulus	1988	Aldringham Common and Walks / Thorpeness Golf Course	1988 - 1997	TM460608
Milky Conecap	Conocybe apala	1983	Sizewell	30/06/1983	TM46R
Conocybe macrospora	Conocybe macrospora	1983	Sizewell	30/06/1983	TM46R

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
Fleecyfoot Conecap	Conocybe velutipes	1988	Aldringham Common and Walks / Thorpeness Golf Course	1988 - 1997	TM460608
Glistening Inkcap	Coprinellus micaceus	1997	Kenton Hills	25/10/1997	TM460642
Lawyer's Wig	Coprinus comatus	1988	Aldringham Common and Walks / Thorpeness Golf Course	1988 - 1997	TM460608
Cortinarius paleaceus	Cortinarius paleaceus	1998	Aldringham Common and Walks / Thorpeness Golf Course	1998	TM460608
Cortinarius paleaceus	Cortinarius paleaceus	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Cortinarius paleaceus	Cortinarius paleaceus	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Variable Oysterling	Crepidotus variabilis	1988	Aldringham Common and Walks /	1988 - 1997	TM460608

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
			Thorpeness Golf Course		
Earthy Powdercap	Cystoderma amianthinum	1997	Aldringham Common and Walks / Thorpeness Golf Course	1997	TM460608
Earthy Powdercap	Cystoderma amianthinum	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Earthy Powdercap	Cystoderma amianthinum	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Blushing Bracket	Daedaleopsis confragosa	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Blushing Bracket	Daedaleopsis confragosa	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Blushing Bracket	Daedaleopsis confragosa	2010	Kenton Hills	24/02/2010	TM4564
Entoloma dysthales	Entoloma dysthales	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Wood Pinkgill	Entoloma rhodopolium	1988	Aldringham Common and Walks /	1988 - 1997	TM460608

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
			Thorpeness Golf Course		
Silky Nolanea	Entoloma sericeum var. sericeum	1983	Sizewell	30/06/1983	TM46R
Witches' Butter	Exidia glandulosa	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Witches' Butter	Exidia glandulosa	2010	Kenton Hills	24/02/2010	TM4564
Velvet Shank	Flammulina velutipes	1988	Aldringham Common and Walks / Thorpeness Golf Course	1988 - 1997	TM460608
Velvet Shank	Flammulina velutipes	2010	Kenton Hills	24/02/2010	TM4564
Turf Bell	Galerina graminea	1983	Sizewell	30/06/1983	TM46R
Dwarf Bell	Galerina pumila	1983	Sizewell	30/06/1983	TM46R
Artist's Bracket	Ganoderma applanatum	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
Artist's Bracket	Ganoderma applanatum	2003	Thorpeness	2003	TM46976100
Tiny Earthstar	Geastrum minimum	2014	Sizewell	15/10/2014	TM476634
Collared Earthstar	Geastrum triplex	1988	Aldringham Common and Walks / Thorpeness Golf Course	1988 - 1997	TM460608
Collared Earthstar	Geastrum triplex	1997	Aldringham Common and Walks / Thorpeness Golf Course	1997	TM460608
Collared Earthstar	Geastrum triplex	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Slimy Spike	Gomphidius glutinosus	1998	Aldringham Common and Walks / Thorpeness Golf Course	1998	TM460608
Spectacular Rustgill	Gymnopilus junonius	1994	Kenton Hills	08/10/1994	TM460642

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
Spectacular Rustgill	Gymnopilus junonius	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Common Rustgill	Gymnopilus penetrans	1996	Kenton Hills	06/10/1996	TM460642
Common Rustgill	Gymnopilus penetrans	1997	Kenton Hills	25/10/1997	TM460642
Common Rustgill	Gymnopilus penetrans	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Clustered Toughshank	Gymnopus confluens	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Poison Pie	Hebeloma crustuliniforme	1983	Sizewell	30/06/1983	TM46R
Poison Pie	Hebeloma crustuliniforme	1998	Aldringham Common and Walks / Thorpeness Golf Course	1998	TM460608
Poison Pie	Hebeloma crustuliniforme	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Root Fomes	Heterobasidion annosum	1994	Kenton Hills	08/10/1994	TM460642

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
Root Fomes	Heterobasidion annosum	1996	Kenton Hills	06/10/1996	TM460642
Root Fomes	Heterobasidion annosum	1997	Kenton Hills	25/10/1997	TM460642
Root Fomes	Heterobasidion annosum	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Blackening Waxcap	Hygrocybe conica	1988	Aldringham Common and Walks / Thorpeness Golf Course	1988 - 1997	TM460608
Blackening Waxcap	Hygrocybe conica	1997	Aldringham Common and Walks / Thorpeness Golf Course	1997	TM460608
Blackening Waxcap	Hygrocybe conica	1998	Aldringham Common and Walks / Thorpeness Golf Course	1998	TM460608
Fibrous Waxcap	Hygrocybe intermedia	2000	Sizewell	24/09/2000	TM475638

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
Vermilion Waxcap	Hygrocybe miniata	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Meadow Wax-Cap	Hygrocybe pratensis	2000	Sizewell	24/09/2000	TM475638
Hygrocybe virginea	Hygrocybe virginea	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Snowy Waxcap	Hygrocybe virginea var. virginea	1998	Aldringham Common and Walks / Thorpeness Golf Course	1998	TM460608
Hygrocybe vitellina	Hygrocybe vitellina	1988	Aldringham Common and Walks / Thorpeness Golf Course	1988 - 1997	TM460608
False Chanterelle	Hygrophoropsis aurantiaca	1983	Sizewell	30/06/1983	TM46R
False Chanterelle	Hygrophoropsis aurantiaca	1988	Aldringham Common and Walks / Thorpeness Golf Course	1988 - 1997	TM460608

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
False Chanterelle	Hygrophoropsis aurantiaca	1994	Kenton Hills	08/10/1994	TM460642
False Chanterelle	Hygrophoropsis aurantiaca	1996	Kenton Hills	06/10/1996	TM460642
False Chanterelle	Hygrophoropsis aurantiaca	1997	Kenton Hills	25/10/1997	TM460642
Herald of Winter	Hygrophorus hypothejus	1997	Aldringham Common and Walks / Thorpeness Golf Course	1997	TM460608
Elder Whitewash	Hyphodontia sambuci	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Sulphur Tuft	Hypholoma fasciculare	1994	Kenton Hills	08/10/1994	TM460642
Sulphur Tuft	Hypholoma fasciculare	1996	Kenton Hills	06/10/1996	TM460642
Sulphur Tuft	Hypholoma fasciculare	1997	Kenton Hills	25/10/1997	TM460642
Sulphur Tuft	Hypholoma fasciculare	1998	Aldringham Common and Walks /	1998	TM460608

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
			Thorpeness Golf Course		
Sulphur Tuft	Hypholoma fasciculare	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Sulphur Tuft	Hypholoma fasciculare	2014	Sizewell	16/07/2014	TM4663
Beech Woodwart	Hypoxylon fragiforme	1997	Aldringham Common and Walks / Thorpeness Golf Course	1997	TM460608
Beech Woodwart	Hypoxylon fragiforme	1997	Kenton Hills	25/10/1997	TM460642
Inocybe eutheles	Inocybe eutheles	1997	Aldringham Common and Walks / Thorpeness Golf Course	1997	TM460608
Inocybe eutheles	Inocybe eutheles	1998	Aldringham Common and Walks / Thorpeness Golf Course	1998	TM460608

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
Sheathed Woodtuft	Kuehneromyces mutabilis	1997	Aldringham Common and Walks / Thorpeness Golf Course	1997	TM460608
Sheathed Woodtuft	Kuehneromyces mutabilis	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Deceiver	Laccaria laccata	1994	Kenton Hills	08/10/1994	TM460642
Deceiver	Laccaria laccata	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Scurfy Deceiver	Laccaria proxima	1997	Aldringham Common and Walks / Thorpeness Golf Course	1997	TM460608
Weeping Widow	Lacrymaria lacrymabunda	1997	Kenton Hills	25/10/1997	TM460642
Saffron Milkcap	Lactarius deliciosus	1994	Kenton Hills	08/10/1994	TM460642
Saffron Milkcap	Lactarius deliciosus	1997	Aldringham Common and Walks / Thorpeness Golf Course	1997	TM460608

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
Saffron Milkcap	Lactarius deliciosus	1998	Aldringham Common and Walks / Thorpeness Golf Course	1998	TM460608
Saffron Milkcap	Lactarius deliciosus	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Oak Milkcap	Lactarius quietus	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Rufous Milkcap	Lactarius rufus	1988	Aldringham Common and Walks / Thorpeness Golf Course	1988 - 1997	TM460608
Rufous Milkcap	Lactarius rufus	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Ugly Milkcap	Lactarius turpis	1994	Kenton Hills	08/10/1994	TM460642
Ugly Milkcap	Lactarius turpis	1996	Kenton Hills	06/10/1996	TM460642
Ugly Milkcap	Lactarius turpis	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Chicken of the Woods	Laetiporus sulphureus	2008	Westleton	29/05/2008	TM4567

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
Aniseed Cockleshell	Lentinellus cochleatus	1998	Aldringham-cum-Thorpe	1998	TM4460
Dune Dapperling	Lepiota erminea	1983	Sizewell	30/06/1983	TM46R
Lepiota oreadiformis	Lepiota oreadiformis	1998	Aldringham Common and Walks / Thorpeness Golf Course	September 1998	TM460608
Tawny Funnel	Lepista flaccida	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Tawny Funnel	Lepista flaccida	2010	Sizewell	29/10/2010	TM4762
Wood Blewit	Lepista nuda	1993	Aldringham Common and Walks / Thorpeness Golf Course	1993	TM460608
Wood Blewit	Lepista nuda	1994	Kenton Hills	08/10/1994	TM460642
Wood Blewit	Lepista nuda	1996	Kenton Hills	06/10/1996	TM460642
Wood Blewit	Lepista nuda	1997	Kenton Hills	25/10/1997	TM460642
Wood Blewit	Lepista nuda	1997	Aldringham Common and Walks /	1997	TM460608

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
			Thorpeness Golf Course		
Giant Funnel	Leucopaxillus giganteus	1998	Aldringham Common and Walks / Thorpeness Golf Course	1998	TM460608
Hedgehog Puffball	Lycoperdon echinatum	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Pestle Puffball	Lycoperdon excipuliforme	1988	Aldringham Common and Walks / Thorpeness Golf Course	1988 - 1997	TM460608
Blackish Puffball	Lycoperdon nigrescens	1988	Aldringham Common and Walks / Thorpeness Golf Course	1988 - 1997	TM460608
Common Puffball	Lycoperdon perlatum	1994	Kenton Hills	08/10/1994	TM460642
Common Puffball	Lycoperdon perlatum	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
Common Puffball	Lycoperdon perlatum	2014	Kenton Hills	16/07/2014	TM4564
Mosaic Puffball	Lycoperdon utriforme	1988	Aldringham Common and Walks / Thorpeness Golf Course	1988 - 1997	TM460608
Parasol Mushroom	Macrolepiota procera	1988	Aldringham Common and Walks / Thorpeness Golf Course	1988 - 1997	TM460608
Parasol	Macrolepiota procera var. procera	2014	Sizewell	16/07/2014	TM4765
Twig Parachute	Marasmiellus ramealis	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Marasmius graminum	Marasmius graminum	1983	Sizewell	30/06/1983	TM46R
Fairy Ring Champignon	Marasmius oreades	1988	Aldringham Common and Walks / Thorpeness Golf Course	1988 - 1997	TM460608

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
Melanoleuca exscissa	Melanoleuca exscissa	1983	Sizewell	30/06/1983	TM46R
Bedstraw Smut	Melanotaenium endogenum	1983	Sizewell	30/06/1983	TM46R
Dog Vomit Slime Mould	Mucilago crustacea	1997	Aldringham Common and Walks / Thorpeness Golf Course	1997	TM460608
Dog Stinkhorn	Mutinus caninus	1996	Kenton Hills	06/10/1996	TM460642
Dog Stinkhorn	Mutinus caninus	1997	Aldringham Common and Walks / Thorpeness Golf Course	1997	TM460608
Dog Stinkhorn	Mutinus caninus	1998	Aldringham Common and Walks / Thorpeness Golf Course	1998	TM460608
Pinkedge Bonnet	Mycena capillaripes	1997	Aldringham Common and Walks / Thorpeness Golf Course	1997	TM460608

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
Yellowleg Bonnet	Mycena epipterygia	1983	Sizewell	30/06/1983	TM46R
Yellowleg Bonnet	Mycena epipterygia	1988	Aldringham Common and Walks / Thorpeness Golf Course	1988 - 1997	TM460608
Yellowleg Bonnet	Mycena epipterygia	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Bonnet Mycena	Mycena galericulata	1997	Aldringham Common and Walks / Thorpeness Golf Course	1997	TM460608
Mycena galopus	Mycena galopus	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Nitrous Bonnet	Mycena leptocephala	1988	Aldringham Common and Walks / Thorpeness Golf Course	1988 - 1997	TM460608
Brownedge Bonnet	Mycena olivaceomarginata	1983	Sizewell	30/06/1983	TM46R

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
Lilac Bonnet	Mycena pura	1996	Kenton Hills	06/10/1996	TM460642
Lilac Bonnet	Mycena pura	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Mycenastrum corium	Mycenastrum corium	2020	Leiston Common	2020	TM4580363480
Coral Spot	Nectria cinnabarina	1988	Aldringham Common and Walks / Thorpeness Golf Course	1988 - 1997	TM460608
Coral Spot	Nectria cinnabarina	1994	Kenton Hills	08/10/1994	TM460642
Coral Spot	Nectria cinnabarina	1996	Kenton Hills	06/10/1996	TM460642
Coral Spot	Nectria cinnabarina	1997	Kenton Hills	25/10/1997	TM460642
Neobulgaria pura	Neobulgaria pura	1988	Aldringham Common and Walks / Thorpeness Golf Course	1988 - 1997	TM460608

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
Dewdrop Mottlegill	Panaeolus acuminatus	1988	Aldringham Common and Walks / Thorpeness Golf Course	1988 - 1997	TM460608
Paraphaeosphaeria michotii	Paraphaeosphaeria michotii	1983	Sizewell	30/06/1983	TM46R
Brown Roll Rim	Paxillus involutus	1988	Aldringham Common and Walks / Thorpeness Golf Course	1988 - 1997	TM460608
Brown Roll Rim	Paxillus involutus	1994	Kenton Hills	08/10/1994	TM460642
Brown Roll Rim	Paxillus involutus	1996	Kenton Hills	06/10/1996	TM460642
Brown Roll Rim	Paxillus involutus	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Oak Crust	Peniophora quercina	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Peronospora trifoliorum	Peronospora trifoliorum	1983	Sizewell	30/06/1983	TM46R
Peziza ampliata	Peziza ampliata	1983	Sizewell	30/06/1983	TM46R

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
Dyer's Mazegill	Phaeolus schweinitzii	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Common Stinkhorn	Phallus impudicus	1994	Kenton Hills	08/10/1994	TM460642
Common Stinkhorn	Phallus impudicus	1996	Kenton Hills	06/10/1996	TM460642
Common Stinkhorn	Phallus impudicus	1997	Kenton Hills	25/10/1997	TM460642
Common Stinkhorn	Phallus impudicus	1997	Aldringham Common and Walks / Thorpeness Golf Course	1997	TM460608
Common Stinkhorn	Phallus impudicus	1998	Aldringham Common and Walks / Thorpeness Golf Course	1998	TM460608
Common Stinkhorn	Phallus impudicus	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Common Stinkhorn	Phallus impudicus	2014	Kenton Hills	17/06/2014	TM4564

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
Pholiota adiposa	Pholiota adiposa	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Shaggy Pholiota	Pholiota squarrosa	1996	Kenton Hills	06/10/1996	TM460642
Pholiota tuberculosa	Pholiota tuberculosa	1997	Aldringham Common and Walks / Thorpeness Golf Course	1997	TM460608
Birch Polypore	Piptoporus betulinus	1988	Aldringham Common and Walks / Thorpeness Golf Course	1988 - 1997	TM460608
Birch Polypore	Piptoporus betulinus	1996	Kenton Hills	06/10/1996	TM460642
Birch Polypore	Piptoporus betulinus	1997	Kenton Hills	25/10/1997	TM460642
Birch Polypore	Piptoporus betulinus	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Birch Polypore	Piptoporus betulinus	2002	Aldringham Common and Walks /	2002	TM465607

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
			Thorpeness Golf Course		
Birch Polypore	Piptoporus betulinus	2014	Leiston Common	16/07/2014	TM460635
Oyster Mushroom	Pleurotus ostreatus	1983	Sizewell	30/06/1983	TM46R
Oyster Mushroom	Pleurotus ostreatus	1997	Aldringham Common and Walks / Thorpeness Golf Course	1997	TM460608
Deer Shield	Pluteus cervinus	1994	Kenton Hills	08/10/1994	TM460642
Deer Shield	Pluteus cervinus	1996	Kenton Hills	06/10/1996	TM460642
Deer Shield	Pluteus cervinus	1997	Aldringham Common and Walks / Thorpeness Golf Course	1997	TM460608
Deer Shield	Pluteus cervinus	1997	Kenton Hills	25/10/1997	TM460642
Deer Shield	Pluteus cervinus	1998	Aldringham Common and Walks /	1998	TM460608

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
			Thorpeness Golf Course		
Deer Shield	Pluteus cervinus	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Pluteus luctuosus	Pluteus luctuosus	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Willow Shield	Pluteus salicinus	1997	Aldringham Common and Walks / Thorpeness Golf Course	1997	TM460608
Willow Shield	Pluteus salicinus	1998	Aldringham Common and Walks / Thorpeness Golf Course	1998	TM460608
Bay Polypore	Polyporus badius	2019	Aldringham-cum-Thorpe	17/08/2019	TM463607
Dryad's Saddle	Polyporus squamosus	1988	Aldringham Common and Walks / Thorpeness Golf Course	1988 - 1997	TM460608

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
Dryad's Saddle	Polyporus squamosus	1994	Kenton Hills	08/10/1994	TM460642
Dryad's Saddle	Polyporus squamosus	1997	Kenton Hills	25/10/1997	TM460642
Pale Brittlestem	Psathyrella candolleana	1997	Aldringham Common and Walks / Thorpeness Golf Course	1997	TM460608
Pale Brittlestem	Psathyrella candolleana	1998	Aldringham Common and Walks / Thorpeness Golf Course	1998	TM460608
Psathyrella pennata	Psathyrella pennata	1983	Sizewell	30/06/1983	TM46R
Psathyrella pennata	Psathyrella pennata	1997	Aldringham Common and Walks / Thorpeness Golf Course	1997	TM460608
Psilocybe merdaria	Psilocybe merdaria	1983	Sizewell	30/06/1983	TM46R

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
Mountain Brownie	Psilocybe montana	1997	Aldringham Common and Walks / Thorpeness Golf Course	1997	TM460608
Mountain Brownie	Psilocybe montana	1998	Aldringham Common and Walks / Thorpeness Golf Course	1998	TM460608
Butter Cap	Rhodocollybia butyracea	1988	Aldringham Common and Walks / Thorpeness Golf Course	1988 - 1997	TM460608
Butter Cap	Rhodocollybia butyracea	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Spotted Toughshank	Rhodocollybia maculata	1997	Kenton Hills	25/10/1997	TM460642
Spotted Toughshank	Rhodocollybia maculata	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Wrinkled Peach	Rhodotus palmatus	1994	Kenton Hills	08/10/1994	TM460642

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
Sycamore Tarspot	Rhytisma acerinum	1994	Kenton Hills	08/10/1994	TM460642
Sycamore Tarspot	Rhytisma acerinum	1996	Kenton Hills	06/10/1996	TM460642
Sycamore Tarspot	Rhytisma acerinum	1997	Kenton Hills	25/10/1997	TM460642
Sycamore Tarspot	Rhytisma acerinum	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Sycamore Tarspot	Rhytisma acerinum	2010	Kenton Hills	24/02/2010	TM4564
Orange Mosscap	Rickenella fibula	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Blackish-Purple Russula	Russula atropurpurea	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Sickener	Russula emetica	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Purple Swamp Brittlegill	Russula nitida	1998	Aldringham Common and Walks / Thorpeness Golf Course	21/06/1998	TM460608

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
Common Yellow Russula	Russula ochroleuca	1994	Kenton Hills	08/10/1994	TM460642
Common Yellow Russula	Russula ochroleuca	1996	Kenton Hills	06/10/1996	TM460642
Common Yellow Russula	Russula ochroleuca	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Sepia Brittlegill	Russula sororia	1998	Aldringham Common and Walks / Thorpeness Golf Course	1998	TM460608
Sepia Brittlegill	Russula sororia	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Crab Brittlegill	Russula xerampelina	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Common Earthball	Scleroderma citrinum	1994	Kenton Hills	08/10/1994	TM460642
Common Earthball	Scleroderma citrinum	1996	Kenton Hills	06/10/1996	TM460642
Common Earthball	Scleroderma citrinum	1997	Aldringham Common and Walks /	1997	TM460608

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
			Thorpeness Golf Course		
Common Earthball	Scleroderma citrinum	1998	Aldringham Common and Walks / Thorpeness Golf Course	1998	TM460608
Common Earthball	Scleroderma citrinum	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Hairy Curtain Crust	Stereum hirsutum	1997	Aldringham Common and Walks / Thorpeness Golf Course	1997	TM460608
Hairy Curtain Crust	Stereum hirsutum	1997	Kenton Hills	25/10/1997	TM460642
Hairy Curtain Crust	Stereum hirsutum	1998	Aldringham-cum-Thorpe	1998	TM4460
Hairy Curtain Crust	Stereum hirsutum	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Weeping Bolete	Suillus granulatus	1997	Aldringham Common and Walks /	1997	TM460608

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
			Thorpeness Golf Course		
Weeping Bolete	Suillus granulatus	1998	Aldringham Common and Walks / Thorpeness Golf Course	1998	TM460608
Weeping Bolete	Suillus granulatus	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Velvet Rollrim	Tapinella atrotomentosa	1997	Kenton Hills	25/10/1997	TM460642
Tephrocybe anthracophila	Tephrocybe anthracophila	1997	Aldringham Common and Walks / Thorpeness Golf Course	1997	TM460608
Earthfan	Thelephora terrestris	1997	Aldringham Common and Walks / Thorpeness Golf Course	1997	TM460608
Earthfan	Thelephora terrestris	1998	Aldringham Common and Walks /	1998	TM460608

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
			Thorpeness Golf Course		
Turkeytail	Trametes versicolor	1988	Aldringham Common and Walks / Thorpeness Golf Course	1988 - 1997	TM460608
Turkeytail	Trametes versicolor	1996	Kenton Hills	06/10/1996	TM460642
Golden Jelly Fungus	Tremella mesenterica	1988	Aldringham Common and Walks / Thorpeness Golf Course	1988 - 1997	TM460608
Golden Jelly Fungus	Tremella mesenterica	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Golden Jelly Fungus	Tremella mesenterica	2010	Kenton Hills	24/02/2010	TM4564
Purplepore Bracket	Trichaptum abietinum	1994	Kenton Hills	08/10/1994	TM460642
Purplepore Bracket	Trichaptum abietinum	1996	Kenton Hills	06/10/1996	TM460642

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
Purplepore Bracket	Trichaptum abietinum	1997	Kenton Hills	25/10/1997	TM460642
Tricholoma inocybeoides	Tricholoma inocybeoides	1998	Aldringham Common and Walks / Thorpeness Golf Course	23/04/1998	TM460608
Soap Tricholoma	Tricholoma saponaceum	1988	Aldringham Common and Walks / Thorpeness Golf Course	1988 - 1997	TM460608
Grey Knight	Tricholoma terreum	1997	Aldringham Common and Walks / Thorpeness Golf Course	1997	TM460608
Plums And Custard	Tricholomopsis rutilans	1994	Kenton Hills	08/10/1994	TM460642
Plums And Custard	Tricholomopsis rutilans	1996	Kenton Hills	06/10/1996	TM460642
Plums And Custard	Tricholomopsis rutilans	1997	Kenton Hills	25/10/1997	TM460642

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
Scurfy Twiglet	Tubaria furfuracea	1983	Sizewell	30/06/1983	TM46R
Scurfy Twiglet	Tubaria furfuracea	1997	Aldringham Common and Walks / Thorpeness Golf Course	1997	TM460608
Scurfy Twiglet	Tubaria furfuracea	1998	Aldringham Common and Walks / Thorpeness Golf Course	1998	TM460608
Winter Stalk Puffball	Tulostoma brumale	1988	Aldringham Common and Walks / Thorpeness Golf Course	1988 - 1997	TM460608
Rooting Shank	Xerula radicata	1997	Aldringham Common and Walks / Thorpeness Golf Course	1997	TM460608
Rooting Shank	Xerula radicata	1998	Aldringham Common and Walks /	1998	TM460608

Recommended Common Name	Recommended Taxon Name	Sample Year	Sample Location	Sample Date	Sample Spatial Reference
			Thorpeness Golf Course		
Candlesnuff Fungus	Xylaria hypoxylon	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561
Dead Man's Fingers	Xylaria polymorpha	2001	Aldringham-cum-Thorpe	07/11/2001	TM4561

Table 4.3 British Mycological Society records from 2009 Fungi Foray.

Recommended Taxon Name	Sample Year	Location
Agaricus impudicus	2009	Kenton Hills
Aleuria aurantia	2009	Kenton Hills
Aleurodiscus aurantius	2009	Kenton Hills
Armillaria lutea	2009	Kenton Hills
Armillaria mellea	2009	Kenton Hills
Armillaria mellea agg.	2009	Kenton Hills
Auricularia auricula-judae	2009	Kenton Hills
Auriscalpium vulgare	2009	Kenton Hills
Baeospora myosura	2009	Kenton Hills
Bjerkandera adusta	2009	Kenton Hills
Bjerkandera adusta	2009	Sizewell Power Station Dunes
Bovista aestivalis	2009	Sizewell Power Station Dunes
Bovista nigrescens	2009	Kenton Hills
Bovista plumbea	2009	Sizewell Power Station Dunes
Calomyxa metallica	2009	Kenton Hills
Calyptella capula	2009	Kenton Hills
Chlorophyllum olivieri	2009	Kenton Hills
Chlorophyllum rhacodes	2009	Sizewell Power Station Dunes
Chromocrea aureoviridis	2009	Kenton Hills
Clitocybe fragrans	2009	Kenton Hills
Clitocybe phaeophthalma	2009	Kenton Hills

Recommended Taxon Name	Sample Year	Location
Collybia butyracea	2009	Kenton Hills
Collybia dryophila	2009	Kenton Hills
Collybia erythropus	2009	Kenton Hills
Conocybe arrhenii	2009	Kenton Hills
Coprinus comatus	2009	Kenton Hills
Crepidotus cesatii	2009	Kenton Hills
Crepidotus luteolus	2009	Kenton Hills
Crepidotus variabilis	2009	Kenton Hills
Crinipellis scabella	2009	Sizewell Power Station Dunes
Crucibulum laeve	2009	Kenton Hills
Cystolepiota seminuda	2009	Kenton Hills
Daedaleopsis confragosa	2009	Kenton Hills
Daedaleopsis confragosa	2009	Sizewell Power Station Dunes
Dendrothele naviculoefibulata	2009	Kenton Hills
Dendrothele griseocana	2009	Kenton Hills
Diaporthopsis urticae	2009	Kenton Hills
Diderma spumarioides	2009	Sizewell Power Station Dunes
Echinostelium colliculosum	2009	Kenton Hills
Echinostelium corynophorum	2009	Kenton Hills
Echinostelium fragile	2009	Kenton Hills
Echinostelium minutum	2009	Kenton Hills
Erysiphe alphitoides	2009	Kenton Hills

Recommended Taxon Name	Sample Year	Location
Erysiphe azaleae	2009	Kenton Hills
Exidia thuretiana	2009	Kenton Hills
Golovinomyces depressus	2009	Kenton Hills
Golovinomyces sordidus	2009	Kenton Hills
Granulobasidium vellereum	2009	Kenton Hills
Gymnopilus penetrans	2009	Kenton Hills
Hygrophoropsis aurantiaca	2009	Kenton Hills
Hypholoma fasciculare	2009	Kenton Hills
Hypochnella violacea	2009	Kenton Hills
Hypoxylon petriniae	2009	Kenton Hills
Laetiporus sulphureus	2009	Kenton Hills
Lasiosphaeria ovina	2009	Kenton Hills
Lepiota cristata	2009	Kenton Hills
Lepiota griseovirens	2009	Kenton Hills
Lepiota subincarnata	2009	Kenton Hills
Lepista flaccida	2009	Kenton Hills
Lepista nuda	2009	Kenton Hills
Lepista sordida	2009	Kenton Hills
Leucoagaricus leucothites	2009	Kenton Hills
Licea marginata	2009	Kenton Hills
Licea operculata	2009	Kenton Hills
Licea pusilla	2009	Kenton Hills

Recommended Taxon Name	Sample Year	Location
Lycoperdon dermoxanthum	2009	Sizewell Power Station Dunes
Lycoperdon lividum	2009	Sizewell Power Station Dunes
Lycoperdon pratense	2009	Sizewell Power Station Dunes
Lycoperdon utriforme	2009	Sizewell Power Station Dunes
Macrolepiota procera	2009	Kenton Hills
Macrolepiota procera	2009	Sizewell Power Station Dunes
Macrotyphula fistulosa	2009	Sizewell Power Station Dunes
Melanoleuca arcuata	2009	Kenton Hills
Melanoleuca polioleuca	2009	Kenton Hills
Melanotus horizontalis	2009	Kenton Hills
Mycena galopus	2009	Kenton Hills
Mycena galopus var. leucogala	2009	Sizewell Power Station Dunes
Mycena pseudocorticola	2009	Sizewell Power Station Dunes
Mycena pura	2009	Kenton Hills
Mycenastrum corium	2009	Sizewell Belts
Nectria cinnabarina	2009	Kenton Hills
Peniophora laeta	2009	Kenton Hills
Peniophora limitata	2009	Kenton Hills
Phleogena faginea	2009	Kenton Hills
Phleogena faginea	2009	Kenton Hills
Physarum pusillum	2009	Kenton Hills
Piptoporus betulinus	2009	Kenton Hills

Recommended Taxon Name	Sample Year	Location
Pluteus plautus	2009	Kenton Hills
Pluteus romellii	2009	Kenton Hills
Pluteus umbrosus	2009	Kenton Hills
Polyporus durus	2009	Kenton Hills
Postia ptychogaster	2009	Kenton Hills
Puccinia arenariae	2009	Kenton Hills
Pycnostysanus azaleae	2009	Kenton Hills
Rhodotus palmatus	2009	Kenton Hills
Rhodotus palmatus	2009	Kenton Hills
Rhytisma acerinum	2009	Kenton Hills
Russula xerampelina	2009	Kenton Hills
Sawadaea bicornis	2009	Kenton Hills
Simocybe haustellaris	2009	Kenton Hills
Stereum hirsutum	2009	Kenton Hills
Stropharia aurantiaca	2009	Kenton Hills
Stropharia cyanea	2009	Kenton Hills
Trichia varia	2009	Kenton Hills
Tubulicium vermiferum	2009	Kenton Hills
Xylaria hypoxylon	2009	Kenton Hills

APPENDIX K: DRAFT DEED OF OBLIGATION UPDATE NOTE

Deadline 6: 6 August 2021

DRAFT DEED OF OBLIGATION [REP5-082]

PROPOSED UPDATES NOTE

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1. INTRODUCTION

1.1 The Applicant submitted Revision 6 of the **draft Deed of Obligation** [REP5-082] at Deadline 5. Following the submission of this draft, the Applicant has continued to consider and engage with issues and concerns raised by the Examining Authority, East Suffolk Council, Suffolk County Council and other interested parties at the Issue Specific Hearings and earlier deadlines.

1.2 The Applicant is grateful for the comments received to date and intends to continue discussions with East Suffolk Council and Suffolk County Council to negotiate the terms of the Deed of Obligation.

1.3 This Note provides a summary of key amendments which the Applicant proposes to make to the draft Deed of Obligation as a result of discussions to date.

1.4 A revised draft Deed of Obligation will be submitted by the Applicant at Deadline 7 incorporating the below and further appropriate amendments resulting from this ongoing engagement.

2. PROPOSED UPDATES TO THE DRAFT DEED OF OBLIGATION

2.1 Conditionality (Clause 3.1) and obligations during the Preparatory Works

2.1.1 The Applicant has discussed the conditionality of the Deed of Obligation and certain obligations within it further with the Councils and intends to amend Clause 3.1 such that certain obligations shall be binding either from the date of the Deed or from the date the Development Consent Order enters into force.

2.1.2 A list of the obligations binding from the date the Development Consent Order enters into force will be annexed to the Deed of Obligation and bind the Applicant during the Preparatory Works. A draft of this Annex is appended to this Note. Consequential amendments have been made where necessary in the Schedules to the Deed to provide that these obligations are binding prior to Commencement.

2.1.3 The proposed amended drafting of Clause 3.1 (with additions <u>underlined</u>) is as follows:

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3.1 Subject to clauses 3.2, 3.2, 3.3, and 3.4, the parties agree that Clause 4 in this Deed shall not have operative effect unless and until the Commencement Date has occurred, save to the extent that Clause 4 relates to: *3.1.1 Paragraph 10, Schedule 11 (Aldhurst Farm Enhancement Works) and Schedule 12 (Noise Mitigation Scheme) which shall have operative effect from the date of this Deed; and* *3.1.2 a Pre-Commencement Obligation, which shall have operative effect upon the date the Development Consent Order enters into force.* *"**Pre-Commencement Obligations**" means those obligations in the Schedules to this Deed listed in Annex [●];*

2.2 **Shall vs Will (etc.)**

2.2.1 The Applicant has noted concerns raised in respect of the language used in the proposed obligations is reviewing this to ensure consistency and to provide that the word "shall" is used wherever an obligation is mandatory.

2.3 **Governance Arrangements**

2.3.1 The Applicant has reviewed the drafting establishing the Governance Groups to ensure consistency of language where appropriate and to clarify the decision-making hierarchy between the Governance Groups, with Review Groups responsible for deciding disputes at the Working Group level and themselves able to refer disagreements to the Delivery Steering Group. The Delivery Steering Group shall be entitled to refer any dispute for expert determination in accordance with Clause 8 of the draft Deed of Obligation.

2.3.2 The Tourism Working Group is to sit beneath the Economic Review Group rather than the Social Review Group. Figure 1 (annexed to the draft Deed of Obligation) will be updated to reflect this and to clarify that the relationship between the Transport Review Group and the Community Safety Working Group is one of information sharing rather than oversight. Disputes amongst the members of the Community Safety Working Group shall be determined by the Social Review Group.

2.3.3 Various updates are proposed to the provisions in Schedule 11 (Natural Environment) relating to the functions of the Ecology Working Group and Environment Review Group, including those in connection with the new and revised monitoring and mitigation plans. The Ecology Working Group provisions will be updated so that it is established by SZC Co, will meet quarterly (or less frequently where agreed by the Ecology Working Group), and will be chaired by East Suffolk Council.

2.3.4 Various updates are proposed in Schedule 16 in response to concerns raised at the ISHs in respect of the operation of the Transport Review Group. These include provisions enabling any member of the Transport Review Group to call a meeting on 28 days' notice (or less in an emergency) and inviting Suffolk Constabulary to attend all meetings of the Transport Review Group, although it will not be a voting member. In addition, further powers are proposed to be provided to the Transport Review Group to respond to impacts (see paragraph 2.9.4 below).

2.3.5 The Applicant is in ongoing discussions with the Councils on the appropriate governance arrangements for community engagement and representation. It is agreed that provision should be made to establish such groups to enable elected representatives of local communities to receive information, ask questions, and raise issues of concern.

2.4 **Design Review Panel**

2.4.1 The Applicant is committed to engaging the RIBA Suffolk Design Review Panel prior to its submission of information to discharge the relevant requirements. Discussions are ongoing with East Suffolk Council in respect of this commitment and further details will be included in the updated draft Deed of Obligation to be submitted at Deadline 7.

2.5 **Project Accommodation (Schedule 3, Paragraph 3)**

2.5.1 The Applicant is in discussions with East Suffolk Council in respect of the proposed controls on the provision of the Project Accommodation.

2.6 **SCC Archaeological Monitoring Contribution (Schedule 8, Paragraph 3)**

2.6.1 Following further discussions with Suffolk County Council, the Applicant proposes to pay this contribution to Suffolk County Council in two instalments, rather than in tranches against the presentation of invoices.

2.6.2 The first instalment shall be payable "prior to carrying out any archaeological mitigation measures at the Sites pursuant to the Development Consent Order" and the second, which relates to reviewing the archaeological written scheme of investigation, evaluation and mitigation reporting, being paid two years later.

2.7 **Public Rights of Way (Schedule 10)**

2.7.1 Upon the request of Suffolk County Council, the Applicant proposes to move the provisions relating to the PROW Fund and the Rights of Way Working Group to Schedule 16.

2.8 **Natural Environment (Schedule 11)**

2.8.1 Various amendments are proposed to paragraph 6 (European Sites Access Contingency Funds) to reflect the revised MMP for Minsmere – Walberswick and Sandlings (North) and the new MMP for Sandlings (Central) and Alde-Ore Estuary submitted at Deadline 5.

2.8.2 Details of the Eel and Migratory Fish Monitoring and Mitigation provisions will be added following further engagement with the Environment Agency. Details of the Environment Co-ordinator's tasks will be added. Additional provisions clarifying the procedure to be followed in relation to the Aldhurst Farm Enhancement Works are proposed.

2.8.3 A new obligation is proposed to require the preparation of a landscape and environment management plan for Aldhurst Farm to continue the long term management arrangements at Aldhurst Farm.

2.8.4 Various consequential amendments are proposed to the definitions of this Schedule to reflect the revised provisions.

2.9 **Transport (Schedule 16)**

2.9.1 The Applicant agrees with Suffolk County Council that provision should be made for further transport schemes at Westleton and Yoxford, with associated Working Groups established to involve the relevant Parish Councils in the design of these. The Applicant proposes that these schemes are designed and delivered by Suffolk County Council, with the Applicant providing financial contributions towards costs.

2.9.2 The Applicant further agrees that the Deed of Obligation shall provide that it is restricted from transporting any Special Order Loads to the SZC Development Site by road along a particular AIL Route, prior to the completion by SZC Co of the approved AIL Structural Improvements in respect of that AIL Route.

2.9.3 The Applicant proposes to pay a further contribution to Suffolk County Council for the carrying out of a B1122 Repurposing Scheme, which will provide enhanced facilities and connectivity for non-motorised users and local communities. An outline design of the B1122 Repurposing Scheme would be annexed to the Deed.

2.9.4 The Applicant also proposes the following amendments to Paragraph 3.5 of Schedule 16 (with additions underlined and deletions ~~struck through~~), providing further powers to the Transport Review Group to require SZC Co to implement or provide funding towards mitigation measures considered reasonably necessary to address impacts related to shortfalls or exceedances against targets or limits in the Construction Worker Travel Plan or the Construction Traffic Management Plan:

3.5 Functions in respect ~~Review~~ of the Transport Management Plans

3.5.1 In the event that:

(A) a Monitoring Report identifies that any of the targets or limits set out in the Construction Worker Travel Plan or the Construction Traffic Management Plan have not been achieved or have been exceeded, or are not reasonably likely to be achieved or are likely to be exceeded; and

(B) the Transport Review Group considers that mitigation measures are reasonably necessary to address the impact of the shortfalls or exceedances, or reasonably likely shortfalls or exceedances, against targets or limits in the Construction Worker Travel Plan or the Construction Traffic Management Plan, and advises SZC Co to that effect,

then SZC Co shall at the next available meeting of the Transport Review Group propose mitigation measures (including a programme for delivery and cost estimate) to address the impact of the shortfalls or exceedances, or reasonably likely shortfalls or exceedances, against targets or limits in the Construction Worker Travel Plan or the Construction Traffic Management Plan, for approval by the Transport Review Group.

3.5.2 In the event that:

(A) SZC Co does not submit proposed mitigation measures to the Transport Review Group in accordance with paragraph 3.5.1; or

(B) SZC Co submits proposed mitigation measures to the Transport Review Group in accordance with paragraph 3.5.1 but the Transport Review Group does not approve those mitigation measures,

then any Transport Review Group Member may submit proposed mitigation measures (including a programme for delivery and cost estimate) to address the impact of the shortfalls or exceedances, or reasonably likely shortfalls or exceedances, against targets or limits in the Construction Worker Travel Plan or the Construction Traffic Management Plan, for approval by the Transport Review Group.

3.5.3 SZC Co shall implement any mitigation measures approved pursuant to paragraphs 3.5.1 or 3.5.2 or (in the event of the Transport Review Group failing to reach a majority decision) by the Delivery Steering Group or an Expert appointed pursuant to Clause 8 of this Deed (as relevant) Provided That where it is agreed that any such mitigation measure will be carried out by Suffolk County Council, Suffolk County Council shall implement the mitigation measure at SZC Co's expense.

3.5.4 The Transport Review Group may approve any revisions to the Construction Worker Travel Plan or the Construction Traffic Management Plan (as relevant), for the purpose of the better functioning of those plans or the more effective mitigation of any transport impacts of the Project or for any other reason ~~sufficient to mitigate the impacts identified, for approval by the Transport Review Group~~.

Appendix

ANNEX [●]

LIST OF PRE-COMMENCEMENT OBLIGATIONS

PART A

Payments to be made on or before Commencement of the Project

1. Schedule 3, Paragraph 2.4 (Housing Fund)
2. Schedule 3, Paragraph 2.5 (Housing Fund)
3. Schedule 4, Paragraph 3.1.1(A) (Emergency Services Contribution)
4. Schedule 8, Paragraph 2.1.1 (First Leiston Abbey Site)
5. Schedule 8, Paragraph 2.2.1 (Second Leiston Abbey Site)
6. Schedule 10, Paragraph 2.1.1 (Sports Facilities Design Payment)
7. Schedule 11, Paragraph 3.1 (Land Management and Skills Scheme)
8. Schedule 11, Paragraph 3.4 (Land Management and Skills Scheme - SCHAONB)
9. Schedule 11, Paragraph 4.1 (Natural Environment Improvement Project Officer)
10. Schedule 11, Paragraph 4.3 (SZC Natural Environment Implementation Officer)
11. Schedule 11, Paragraph 6.1 (European Sites Access Contingency Funds)
12. Schedule 14, Paragraph 2.3.1 (Community Fund)
13. Schedule 15, Paragraph 2.1 (Tourism Programme Manager)
14. Schedule 15, Paragraph 3.1.1 (Tourism Fund)
15. Schedule 16, Paragraph 4.3.4 (Wickham Market Improvement Contribution)
16. Schedule 16, Paragraph 4.4.4 (Leiston Transport Contribution)
17. Schedule 16, Paragraph 4.5.4 (Marlesford and Little Glemham Transport Contribution)
18. Schedule 16, Paragraph 5.1 (B1078 Road Safety Contribution)
19. Schedule 16, Paragraph 6.1.2 (B1122 Pre-SLR Contribution)
20. Schedule 16, Paragraph 9.1.1 (Highway Design and Supervision Fees)
21. Schedule 16, Paragraph 12.1 (PROW Fund)

Governance Groups to be established on or before Commencement of the Project

22. Schedule 3, Paragraph 6.1.1 (Accommodation Working Group)
23. Schedule 4, Paragraph 5.1 (Community Safety Working Group)
24. Schedule 6, Paragraph 4.1 (Health Working Group)
25. Schedule 7, Paragraph 2.9.1 (Economic Review Group)
26. Schedule 7, Paragraph 2.10.1 (Employment Skills and Education Working Group)
27. Schedule 7, Paragraph 3.3.1 (Supply Chain Working Group)
28. Schedule 11, Paragraph [12.1] (Environment Review Group)

29. Schedule 11, Paragraph [14.1] (Ecology Working Group)
30. Schedule 11, Paragraph [15.1] (Natural Environment Awards Panel)
31. Schedule 15, Paragraph 5.1 (Tourism Working Group)
32. Schedule 16, Paragraph 3.1 (Transport Review Group)
33. Schedule 16, Paragraph 4.1 (Rights of Way Working Group)
34. Schedule 17, Paragraph 3.1 (Delivery Steering Group)
35. Schedule 17, Paragraph 6.1.1 (Planning Group)
36. Schedule 17, Paragraph 6.2.1 (Social Review Group)

<u>Other obligations to be satisfied on or before Commencement of the Project</u>

37. Schedule 3, Paragraph 5.1 (Accommodation Management System)
38. Schedule 4, Paragraph 2,1 (On-site Emergency Response)
39. Schedule 6, Paragraph 2.1 (Sizewell Health)
40. Schedule 7, Paragraph 2.1.1 (Workforce Delivery Strategy – Site Operations / Site Services / Enabling Works Phase)
41. Schedule 7, Paragraph 2.1.3 (Workforce Delivery Strategy Programme)
42. Schedule 7, Paragraph 2.7.1 (Sizewell C Jobs Service)
43. Schedule 7, Paragraph 2.8.1 (Young Sizewell C)
44. Schedule 11, Paragraph 2.1 (Natural Environment Improvement Fund)
45. Schedule 11, Paragraph 11.1.1 (Environment Co-ordinator)
46. Schedule 14, Paragraph 2.2 (Deed of Transfer and Administration Agreement)
47. Schedule 14, Paragraph 2.4 (Administration Agreement)
48. Schedule 14, Paragraph 2.5 (Administration Agreement)
49. Schedule 16, Paragraph 2.1 (TMMS)
50. Schedule 16, Paragraph 3.3.1 (Transport Coordinator)
51. Schedule 16, Paragraph 6.1.1 (B1122 Survey)
52. Schedule 16, Paragraph 7.1 (AIL Structural Survey)
53. Schedule 16, Paragraph 7.3 (AIL Route Scheme)

PART B

<u>Payments to be made on or before Commencement of particular works</u>

54. Schedule 8, Paragraph 3 (SCC Archaeological Monitoring Contribution)
55. Schedule 10, Paragraph 2.2.2 (Leiston Sports Facilities Works Payment)

<u>Obligations to be satisfied on or before Commencement of particular works</u>

56. Schedule 9, Paragraph 2.2 (Detailed Implementation Programmes)
57. Schedule 10, Paragraph 2.2.1 (Discharge of Leiston Sports Facilities Requirement)

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PART C

Obligations requiring compliance prior to Commencement

58. Schedule 1 (Councils' General Obligations)

59. Schedule 16, Paragraph 11 (Highways Agreements)

60. Schedule 17, Paragraph 2 (Governance)

APPENDIX L: SIZEWELL B CONSTRUCTION PHOTOGRAPHS

SZB CONSTRUCTION PHOTOS

Plate 1.1 Aerial photograph of SZB Construction, January 1988

Plate 1.2 Aerial photograph of SZB Construction, April 1988

Plate 1.3 Aerial photograph of SZB Construction, September 1988

Plate 1.4 Aerial photograph of SZB Construction, July 1989

Plate 1.5 Aerial photograph of SZB Construction, July 1989

Plate 1.6 Aerial photograph of SZB Construction

Plate 1.7 Aerial photograph of SZB Construction

Plate 1.8 Aerial photograph of SZB Construction

Plate 1.9 Aerial photograph of SZB Construction, May 1990

Plate 1.10 Aerial photograph of SZB Construction, November 1990

Plate 1.11 Aerial photograph of SZB Construction, February 1991

Plate 1.12 Aerial photograph of SZB Construction, July 1991

Plate 1.13 Aerial photograph of SZB Construction

Plate 1.14 Aerial photograph of SZB Construction, November 1991

Plate 1.15 Aerial photograph of SZB Construction, February 1992

Plate 1.16 Aerial photograph of SZB Construction

Plate 1.17 Aerial photograph of SZB Construction

Plate 1.18 Aerial photograph of SZB Construction, April1992

Plate 1.19 Aerial photograph of SZB Construction, July 1992

Plate 1.20 Aerial photograph of SZB Construction, July 1992

Plate 1.21 Aerial photograph of SZB Construction, November 1992

Plate 1.22 Aerial photograph of SZB Construction, November 1992

Plate 1.23 Aerial photograph of SZB Construction, July 1993

Plate 1.24 Aerial photograph of SZB Construction, January 1993

Plate 1.25 Aerial photograph of SZB Construction, January 1993

Plate 1.26 Aerial photograph of SZB Construction, November 1993

APPENDIX M: MINSMERE SLUICE OPERATION AND IMPACTS REVIEW

CONTENTS

PLATES

1 MINSMERE SLUICE OPERATION AND IMPACTS REVIEW

1.1 Introduction

1.1.1 This paper considers specific concerns raised by stakeholders and Interested Parties in relation to the Minsmere Sluice. The sluice is an engineered structure that controls the discharge of surface water from several catchments to the North Sea.

1.1.2 The purpose of this paper is to:

- provide an overview of the potential effects of the Project on the operation of the Minsmere Sluice
- signpost where within the Application these potential effects have been considered; and
- summarise the conclusions of those assessments

1.2 Minsmere Sluice and the contributing catchments

1.2.1 The systems of particular relevance to the operation of Minsmere Sluice are the Minsmere River (New Cut and Old River), Leiston Drain, Scott's Hall Drain and IDB Drain No. 7. The contributing catchments cross the low-lying coastal plain inland of the sluice, which discharges to the North Sea.

1.2.2 Plate 1.1 is reproduced from the Surface Water Conceptualisation Model (**Volume 2, Chapter 19, Environmental Statement**, Figure 19E.2, January 2020) [APP-309] and shows the surface water features and drainage units that drain towards the Minsmere Sluice.

1.2.3 Minsmere Sluice is therefore the main control structure governing the flow and water level regimes of these catchments, which include Eastbridge, the RSPB Minsmere Reserve, Sizewell Belts and Sizewell Village.

1.2.4 Plate 1.2 is reproduced from the Surface Water Conceptualisation Model (**Volume 2, Chapter 19, Environmental Statement**, Figure 19E.3, January 2020) [APP-309] and shows the key catchment watercourses and main surface water monitoring points.

1.2.5 The sluice, as shown in Plate 1.3 (reproduced from the Surface Water Conceptualisation Model in **Volume 2, Chapter 19, Environmental Statement**, Figure 19E.4 [APP-309]), is divided into two chambers, each with its own gravity-outlet culvert. The northern chamber receives flows from the Minsmere New Cut, while the southern chamber receives flows from Leiston Drain and Scott's Hall Drain.

1.2.6 The southern chamber is also connected to the Minsmere New Cut through its southern culvert, which includes a penstock at its upstream face. This inlet valve is only opened during times of excessive back flooding upstream of the structure within the Minsmere River catchment (i.e. enabling the southern chamber to be used to directly assist draining from the Minsmere New Cut).

1.2.7 When river levels exceed sea levels (low tide), water flows from river to sea. Importantly, when sea levels exceed river levels (high tide), river flow will cease, with water stored upstream of the sluice (termed 'tide locking'). Some ingress of seawater into the freshwater system has been factored into the Environment Agency's design. This controlled saline intrusion replicates the conditions created by the original, unintentionally leaky structure, as explained at **Volume 2, Chapter 19** of the **Environmental Statement** [APP-297].

1.2.8 The Leiston Drain provides a relatively small hydrological input and supplies approximately 18% of the total contributing catchment converging at Minsmere Sluice. The Leiston Drain catchment has the following contributing sub-catchments: Leiston Drain, Sizewell Drain, IDB Drain DRN16390201 and IDB Drain No. 7.

1.2.9 The vast majority of the main development site boundary is within the Leiston Drain catchment (as shown on Plate 1.2).

1.2.10 From a geomorphological perspective, the Leiston Drain has been artificially modified, is uniform and trapezoidal in shape with near-vertical banks and has a gentle longitudinal profile.

1.2.11 Groundwater and surface water (i.e. the baseflow retained within the drainage network) are at similar levels to one another within the catchment of the Leiston Drain, varying between 0.2m and 1.2m AOD across the site. Stage and flow monitoring at location G1 (in Leiston Drain, close to the proposed SSSI crossing (Plate 1.2)), shows that during dry periods, the recorded water level in the drainage network is lower than the groundwater level at the closest monitoring point. This indicates that groundwater is contributing to water levels within the drainage network. When water levels are elevated in the ditches, this movement will be reversed.

1.2.12 This mixing is part of the normal hydrological regime for the site. The mechanism for baseflow contribution from groundwater to surface water systems is explained further in the **Groundwater Conceptual Model**

Paper, **Appendix B** to the **Applicant Comments on Written Representations**, submitted at Deadline 3 [REP3-043].

1.2.13 In addition to data for Leiston Drain illustrating seasonal fluctuations, there are also numerous flow reversals evident in the data, which are linked to tidal cycles.

1.3 Policy and existing sluice management

1.3.1 The Shoreline Management Plan (SMP) (Ref. 1) defines the policy for Minsmere Sluice and the wider coast in the vicinity of the structure (MIN12.3 and MIN12.4). The policy for the wider coast to the north of the proposed Sizewell C Project is for managed realignment, whereas the position for Minsmere Sluice is for it to be maintained. This is the current policy for coastal management that the Sizewell C Project will need to observe.

1.3.2 The Environment Agency owns and is responsible for the operation and maintenance of Minsmere Sluice. Consistent with the policy stated in the SMP, the Environment Agency refurbished Minsmere Sluice in 2013 and this work was completed with a 50-year appraisal life (Ref. 2). The appraisal business case secured capital and maintenance costs predicted over that 50-year period.

1.4 Stakeholder and Interested Parties concerns

1.4.1 In addressing the points set out above in section 1.1, this paper specifically considers points raised by stakeholders, both during pre-application engagement and as Interested Parties since submission of the DCO application.

1.4.2 The RSPB has expressed a concern that if flows within the Leiston Drain are increased as a result of the Project, this would cause excessive back flooding of the Scott's Hall Drain (and therefore impact on the operation of the sluice). This back flooding, which occurs under existing baseline conditions, can result in increased inundation of the Scrape, Lowered Reed Beds and Dowleys and North Levels drainage units which could potentially affect waterfowl that utilise the area. This aspect is considered in section 1.5 a) below.

1.4.3 In addition, the RSPB has raised a further, more general, concern over the potential decreased efficiency of the sluice as a result of increased flows resulting from the Project, with wider impacts on drainage of the catchment, for example on the Minsmere River. The assessment undertaken shows that there is no potential for increased flows, as set out in section 1.5 a) below.

1.4.4 The RSPB has also expressed concern over the ability of the Project to attenuate flow and control water quality from the water management zones during construction. Should this be the case there may be increased flows at the Minsmere Sluice. At Deadline 3 the RSPB provided comments on the Outline Drainage Strategy submitted by SZC Co. at Deadline 2. SZC Co. is submitting responses to these comments in **Appendix H** of **Comments on Submissions from Earlier Deadlines** (Doc Ref. 9.63) and these aspects are therefore not considered in detail within this paper. However, this aspect is considered in outline in section 1.5 b) below.

1.4.5 The RSPB has also expressed concern as to the impact on designated habitats resulting from flood risk impacts due to the Project. In section 1.5 c) this paper highlights the potential effects that relate to the operation of the Minsmere Sluice itself. Other mechanisms of flood risk impact on the designated habitats are addressed in the **Main Development Site FRA** [AS-018] and **Main Development Site FRA Addendum** [AS-157].

1.4.6 Finally, East Suffolk Internal Drainage Board has indicated concerns regarding accretion of coastal sediment at the Minsmere Sluice, occurring as a result of the Project. This topic was included within the Examining Authority's ExQ1 written questions and SZC Co. provided a response at Deadline 2. This aspect is considered in section 1.5 d) below.

1.5 Summary of proposals and potential mechanisms of effect

a) Changes in groundwater and surface water levels

1.5.1 A small degree of change is predicted in both the Crag and peat groundwater systems during the construction period. These predicted effects (seasonal, non-continuous and very small lowering of water levels in the first 3-4 years of construction) result from (i) the realignment and shortening of the Sizewell Drain (which increases the hydraulic gradient of the watercourse and therefore encourages a slightly higher rate of flow) and (ii) dewatering of groundwater from beneath the main construction area, within a low permeability cut-off wall.

1.5.2 The results of the numerical model are presented graphically in Figures 19A.75 to 19A.111 of APP-301 and APP-302, and the key findings are summarised in the **Groundwater Conceptual Model Paper**, **Appendix B** to the **Applicant Comments on Written Representations**, submitted at Deadline 3 [REP3-043].

1.5.3 The impacts do not extend to Minsmere Sluice. Specifically, predicted drawdown from dewatering does not extend to the sluice and no significant changes in the surface water regime are predicted from either of the above effects.

1.5.4 Consequently, no significant effect is predicted at Minsmere Sluice from any changes in groundwater or surface water. Furthermore, in respect of the RSPB concerns described in paragraphs 1.4.2 and 1.4.3, there is no significant effect predicted on the function of the southern chamber of the Minsmere Sluice and the ability to drain Scott's Hall Drain and Minsmere New Cut.

1.5.5 In its response to the Examining Authority's written questions and requests for information (ExQ1), Natural England confirmed that it had concluded that there is unlikely to be significant hydrological effects on Minsmere to Walberswick Heath and Marshes SAC, Minsmere-Walberswick SPA, Ramsar site, and SSSI (ExQ1 Bio.1.57) [REP2-152].

i. Enhanced control

1.5.6 As part of the construction phase, the proposals include for the realignment of the Sizewell Drain (a tributary of the Leiston Drain), parallel to the base of the platform slope. At its northern extent, it would discharge to the Leiston Drain upstream of the proposed SSSI crossing.

1.5.7 The modelling and assessment concluded that there would be no significant effect and correspondingly no mitigation measures are formally proposed or modelled as part of the assessment.

1.5.8 Notwithstanding the results of the assessment SZC Co. has, in consultation with stakeholders, proposed that enhanced water level control be achieved to further minimise any effect on water levels and enable greater control of water levels within the Sizewell Marshes SSSI. This would be achieved through the use of water control structures [APP-297] within the Sizewell Drain to moderate the rate of discharge from the marshes. This approach would allow for fine tuning of the water management regime. The effect of this control will solely be on low or normal water levels within Sizewell Marshes and only in relation to countering the very small lowering of water levels predicted.

1.5.9 Consequently, no significant effect is predicted at Minsmere Sluice from the enhanced control of water levels proposed for the Sizewell Marshes, which would tend to delay water movement from the marshes rather than increase flows towards the sluice. Specifically, in respect of the RSPB concerns described in paragraphs 1.4.2 and 1.4.3, there is no significant effect predicted on the function of the southern chamber of the Minsmere Sluice or the ability to drain Scott's Hall Drain and Minsmere New Cut.

b) Operation of the water management zones

1.5.10 The **Outline Drainage Strategy** [REP2-033] sets out the management principles for controlling storm events up to the 1 in 100-year event, whilst managing discharges to watercourses at greenfield runoff rates. The control of runoff to greenfield rates up to the 1 in 100-year event therefore provides no mechanism for increasing flows towards the sluice. Above a 1 in 100-year event the sluice is already impacted under baseline conditions, as described in section 1.5 c) below.

1.5.11 The strategy is validated in a series of drainage technical notes for the main development site submitted at Deadline 5 (Appendices C, D and E to **SZC Co. Comments on Submissions from Earlier Deadlines** [REP5-120]).

1.5.12 Importantly, the groundwater model simulates the influence of the drainage strategy on the fluvial catchments. It concludes that no significant effects are predicted for surface water systems as a consequence of the operation of the water management zones [APP-297].

1.5.13 Consequently, the **Outline Drainage Strategy** [REP2-033] provides for the effective management of drainage and flows into the watercourses. Specifically, in respect of the RSPB concern described in paragraph 1.4.4, the control of runoff to greenfield rates enables the ongoing and effective function of the southern chamber of the Minsmere Sluice and the ability to drain Scott's Hall Drain and Minsmere New Cut.

c) Changes in flood risk

1.5.14 The **Main Development Site FRA** [AS-018] and **Main Development Site FRA Addendum** [AS-157] consider the impacts of the construction and operational phases for a range of return periods, climate change scenarios and from different sources. This section considers the question of whether the impact on flood risk from the Project in the vicinity of the Minsmere Sluice would have an effect on the operation of the sluice, in respect of the RSPB concerns described in paragraphs 1.4.2, 1.4.3 and 1.4.5.

1.5.15 This section therefore considers infrequent or extreme events whereas section 1.5 a) considers normal operating conditions.

i. Fluvial flooding

1.5.16 For offsite fluvial events, this summary is framed around the 35% climate change scenario. The following conclusions can be drawn from the predicted change in long-term flood risk for different return periods from fluvial events.

1.5.17 No significant change in duration, depth, velocity or extent are predicted to the north of Minsmere Sluice for the fluvial flood events modelled (1 in 5-year, 1 in 20-year, 1 in 100-year or 1 in 1,000-year flood events).

1.5.18 Consequently, since the change in flood characteristics is not significant, no significant effect on the operation of the sluice can be concluded.

ii. Coastal flooding

1.5.19 For both the coastal inundation and tidal breach events, this summary is framed around the 2030 and 2090 epochs on the basis that any changes in policy and/or maintenance and operation of Minsmere Sluice are likely to have been implemented by 2090 epoch. The following conclusions can be drawn from the predicted change in long-term flood risk for different return periods from either of the coastal events:

1.5.20 For a 1 in 200-year coastal inundation event, the change in flood depth within the Minsmere Levels is less than 0.03m at both, 2030 and 2090 epochs, with overall average baseline flood depth of approximately 0.4m and 1.5m, respectively. For a 1 in 200-year tidal breach event, a change in depth of between 0.03m and 0.1m is predicted in the reedbed immediately to the north of Minsmere Old River and Island Mere for both, 2030 and 2090 epochs, with overall average baseline flood depths of approximately 1m and 2.2m, respectively.

1.5.21 No change in velocity or extent is forecast to the north of Minsmere New Cut. The above change in flood depth, of between 0.03m and 0.1m, is also applicable to both the coastal inundation and tidal breach modelling during the 1 in 1,000-year event in 2030 and 2090.

1.5.22 The extreme sea level for the 1 in 200-year coastal event in 2030 is 3.2mAOD (including baseline event) whereas the soffit levels of the culverts connecting the drains to the chambers are well below 1mAOD. Therefore, at such an event the outfall will be tidally locked.

1.5.23 This confirms that the increase in flood depth north of Minsmere New Cut is not related to the sluice discharge capacity but instead is related to the displacement of water from the development area (main platform and SSSI crossing) when the existing defences are overtopped.

1.5.24 Further information is presented in the Main Development Site Flood Risk Assessment and additional submissions:

- Main Development Site Flood Risk Assessment Addendum [AS-157]

- Appendix C: Fluvial model results - difference in flood depth, hazard and velocity ('with scheme' vs baseline) [AS-162, AS-163 and AS-164] and baseline flood depth, hazard and velocity [APP-095 and APP-096]

- Appendix D: Tidal breach and coastal inundation modelling report addendum [AS-164, AS-165, AS-166, AS-167, AS-168, AS-169, AS-170]

d) Changes in coastal geomorphology

1.5.25 The effect of changes in coastal processes on the long-term viability of Minsmere Sluice has been considered separately within the examination through the Examining Authority's Written Questions (FR.1.73 and CG.1.18) and is summarised here. In particular, East Suffolk Internal Drainage Board has indicated concerns regarding accretion of coastal sediment at the Minsmere Sluice (Relevant Representation [RR-0345] and Statement of Common Ground item 5.3 [REP2-067]).

1.5.26 The potential accretion (or a reduction in erosion rates) on the southern Minsmere frontage (within a few hundred metres of Sizewell C) arising from deposition SCDF sediments would not extend to the sluice, located approximately 1.6km to the north. Therefore, it would not affect the sluice's ability to discharge, for the following reasons:

- (a) SCDF beach shingle (proposed mitigation) would, in net terms, drift slowly to the south, not to the north. Some shingle may accumulate immediately to the north of Sizewell C, but not as far as the sluice (longshore transport calculations and tracer studies indicate that detectable volumes of SCDF shingle are not likely to be encountered more than a few hundred metres north of Sizewell C). Therefore, there would be no impact at the Minsmere Sluice outfall.

- (b) Any SCDF sediments that are transported north of Sizewell C would most likely be deposited and retained in areas where the shoreline has already receded to a more westerly position than the SCDF (tens to a few hundred metres north of Sizewell C). This would tend to trap shingle and prevent further northward transport for as long as the more westerly shoreline position persisted.

- (c) The sluice's outfall pipe will continue to disrupt natural shingle transport for as long as it is present, which can be seen as an alternating accumulation of sediment on either side of the sluice determined by storm direction. Sizewell C's activities will have no bearing on that process.

1.5.27 Further information and detail on the modelling and assessment of coastal processes and sediment transport is provided in **Volume 2, Chapter 20 of the ES** [APP-311] and **Appendix 20A of the ES** [APP-312] and **modelling reports for the SCDF** [REP3-032] and [REP3-048].

1.5.28 In respect of East Suffolk Internal Drainage Board's concern described in paragraph 1.4.6, there is no significant effect predicted on the function of the Minsmere Sluice due to impacts on coastal processes by the Project.

Plate 1.1: Surface water features and drainage units that drain towards the Minsmere Sluice (reproduced from Surface Water Conceptual Model) [APP-309]

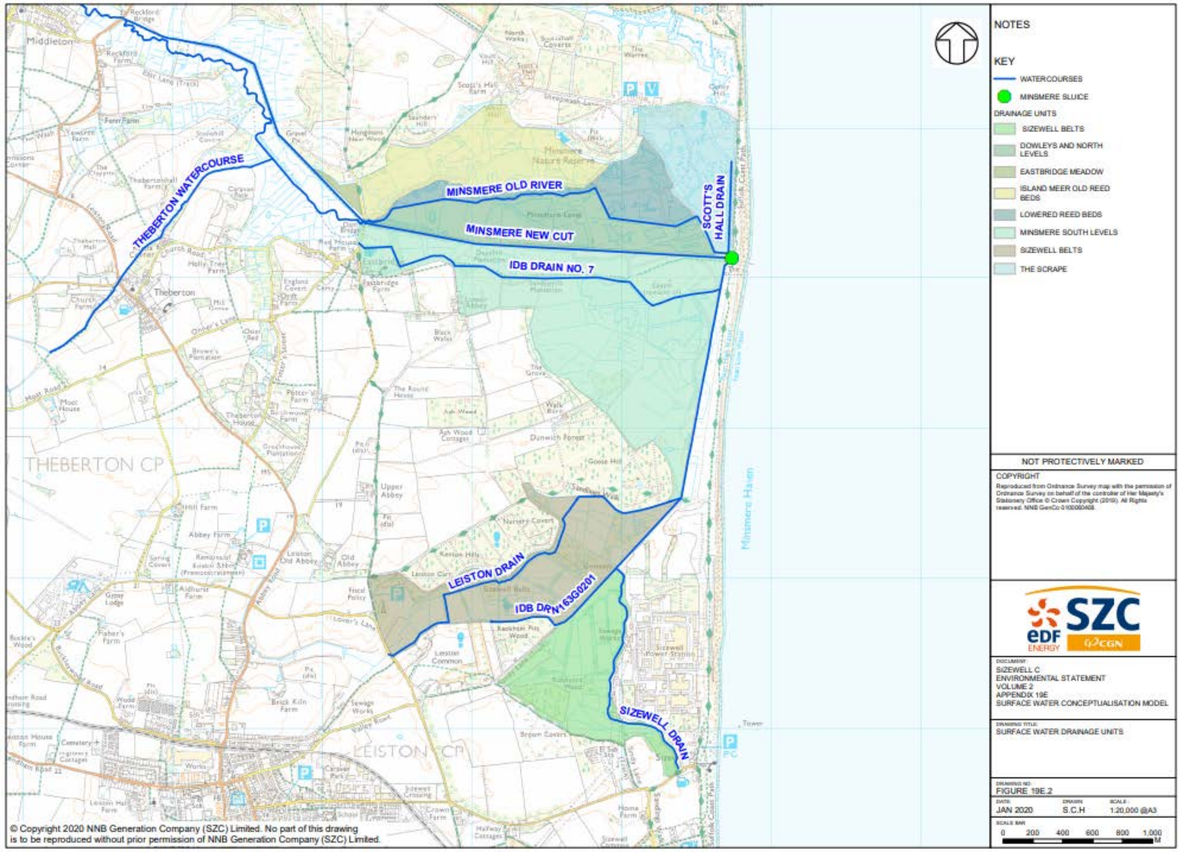


Plate 1.2: Summary plan of key catchment watercourses and monitoring locations (reproduced from Surface Water Conceptual Model) (APP-309)

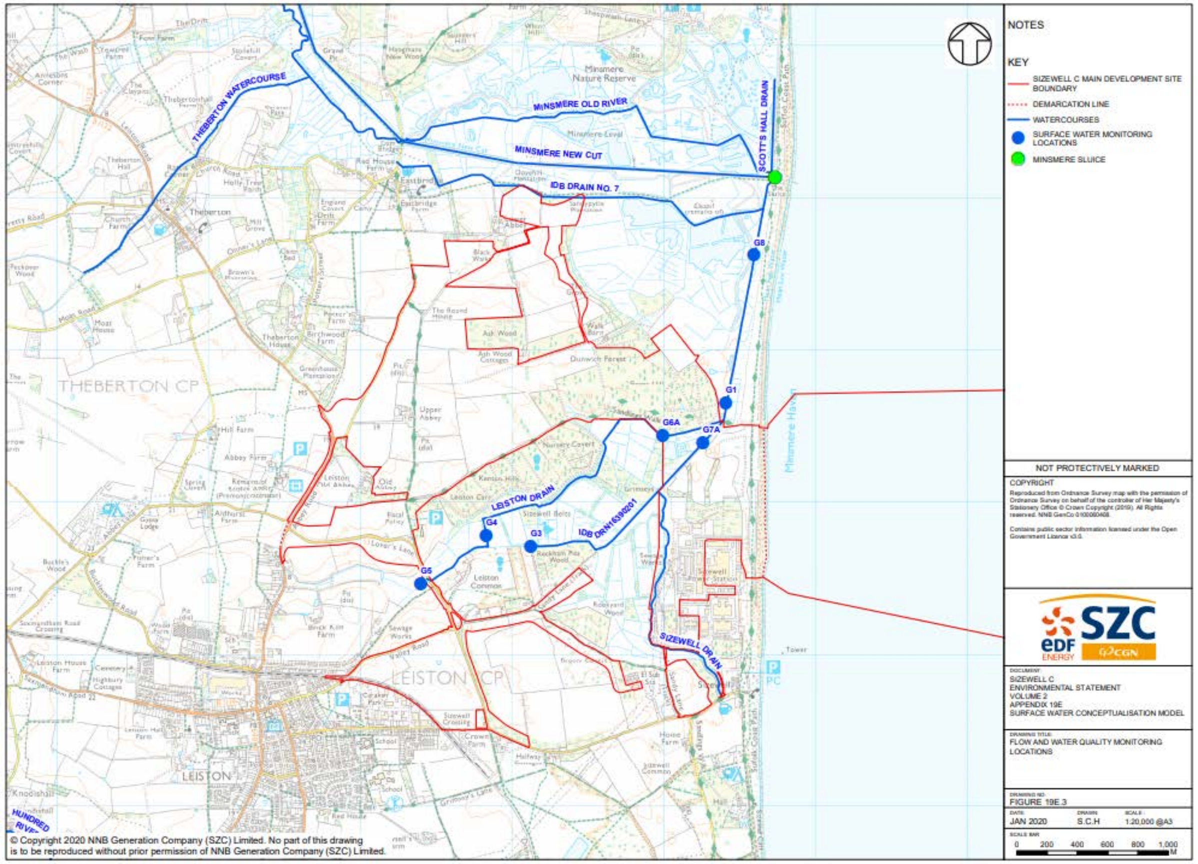
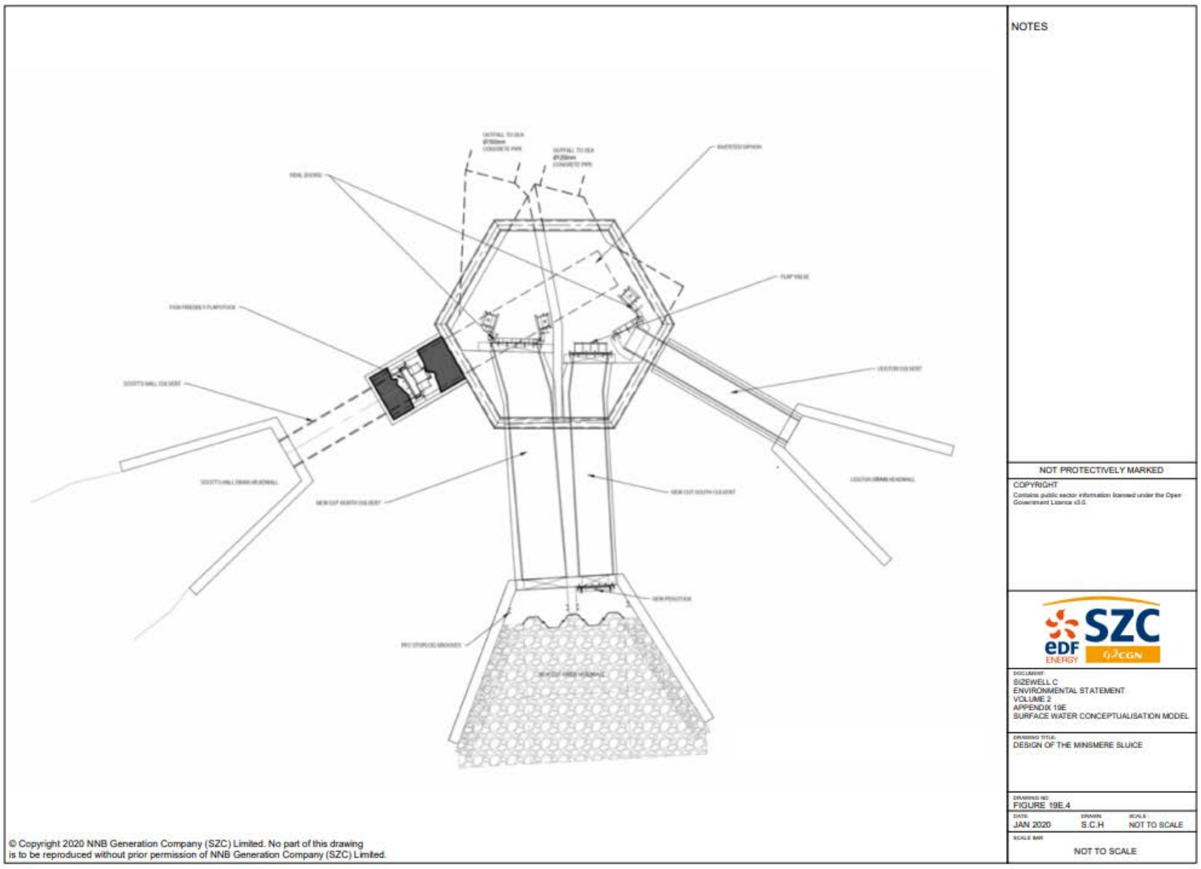


Plate 1.3: Design of Minsmere Sluice (reproduced from Surface Water Conceptual Model) (APP-309)



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2. Minsmere Sluice and Embankment Works Project Appraisal Report, Authority Scheme IMAN002421, Environment Agency Anglian Region, Version 1.0 (Final – Submission to PAB), 3 July 2012.

APPENDIX N: WSP TECHNICAL NOTE – MAIN SITE ENTRANCE ROUNDABOUT

TECHNICAL NOTE

DATE: 16 June 2021 **CONFIDENTIALITY:** Public

SUBJECT: SZC main site entrance roundabout

PROJECT: Sizewell C

MAIN SITE ENTRANCE ROUNDABOUT – DESIGN BASIS

The main site entrance roundabout would facilitate access to Sizewell C on a temporary and permanent basis. The roundabout would be located just north of the B1122/Eastbridge Road junction and east of the B1122. This enables EDF to build it largely off-line to minimise traffic management requirements during the roundabout construction period, keeping open the route between the A12 and Leiston but also to/from SZB.

The layout diverts a short section of Eastbridge Road to tie into the new roundabout. Provision of a dedicated Eastbridge Road arm allows vehicles to access the village directly. The existing Eastbridge Road would be closed to the east of Abbey Cottages. The proposed roundabout would have five arms during the construction phase (four arms during the operational phase of the power station), running clockwise from north-west:

- the B1122 north towards Theberton;
- a realigned Eastbridge Road;
- Sizewell C construction workers' entrance;
- Sizewell C freight entrance; and
- the B1122 south towards Leiston.

The layout separates the workers access from freight access. If a collision, breakdown or maintenance work blocked one of the arms, worker movements (buses and car parking) and freight movements could continue to use the other arm, so allowing movements into and out of the SZC site to continue without affecting movements on the B1122.

The roundabout needs to accommodate abnormal loads (AILs) travelling not only to the SZC construction site but also to SZB. Both SZC and SZB AILs vehicles take a route through the central island of the roundabout – so the central island will have elements that are easily demountable.

The five arms must meet entry deflection and other geometric design requirements set out in the Department for Transport DMRB standards. This is Suffolk County Council's requirement for technical approval of the design prior to construction and to satisfy DMRB road safety audit requirements. The layout is based on a 40 mph design speed, reduced from the current national speed limit (60 mph for cars, 50 mph for buses and goods vehicles) on this stretch of the B1122. As well as reducing speeds and thus facilitating turning in and out of the site entrance, the lower design speed reduces the landtake associated with forward visibility and other geometric requirements. SCC have indicated their in-principle agreement to a 40 mph design speed.

Design development work has confirmed that, to meet the DMRB entry deflection and other requirements on all five arms, the roundabout's inscribed circle diameter needs to be 65m. A smaller ICD would not meet DMRB and road safety audit requirements and therefore SCC would be unlikely to give technical approval for the scheme.

The diverted Bridleway 19 would incorporate a Pegasus crossing, located on the north side of the roundabout. This signalised crossing would allow equestrians to travel between the western side of the B1122 and the realigned Eastbridge Road.

SCC confirmed that the roundabout would need street lighting, due to the presence of the Pegasus crossing, 40 mph speed limit and volume and composition of traffic movements.