DBS Offshore Wind

RWE Renewables UK Dogger Bank South (West) Limited

RWE Renewables UK Dogger Bank South (East) Limited

Dogger Bank South Offshore Wind Farms

Review of Evidence on Recovery of Sandbank Habitat Following Habitat Damage (Revision 2) (Clean)

Document Date:	March 2025
Application Reference:	10.36
Revision Number:	02
Classification:	Unrestricted

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Company:	**RWE Renewables UK Dogger Bank South (West) Limited and RWE Renewables UK Dogger Bank South (East) Limited**	Asset:	**Development**
Project:	**Dogger Bank South Offshore Wind Farms**	Sub Project/Package	**Consents**
Document Title or Description:	Review of Evidence on Recovery of Sandbank Habitat Following Habitat Damage (Revision 2) (Clean)		
Document Number:	005303970-02	Contractor Reference Number:	PC2340-RHD-ZZ-XX-RP-Z-0155

Rev No.	Date	Status/Reason for Issue	Author	Checked by	Approved by
01	November 2024	First Issue	RHDHV	RWE	RWE
02	March 2025	Submission at Deadline 3	RHDHV	RWE	RWE

Revision Change Log			
Rev No.	**Page**	**Section**	**Description**
01	N/A	N/A	Submitted at Pre-Examination Procedural Deadline
02	28-31	Appendix A	Additional information added into Table A-1 on the MarESA sensitivity of habitats and biotopes in response to Natural England's written advice [REP2-065] on benthic and intertidal ecology.
02	32	Figure A1	Updates to Figure A1 were made to indicate a greater quantification of bathymetry depths at the request of the Examining Authority (see BE1.9 in **The Applicants' Responses to EXQ1** [document reference 13.2])

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Glossary

Term	Definition
Array Area	The DBS East and DBS West offshore Array Areas, where the wind turbines, offshore platforms and array cables would be located. The Array Areas do not include the Offshore Export Cable Corridor or the Inter-Platform Cable Corridor within which no wind turbines are proposed. Each area is referred to separately as an Array Area.
Baseline	The existing conditions as represented by the latest available survey and other data which is used as a benchmark for making comparisons to assess the impact of the Projects.
Environmental Impact Assessment	A statutory process by which certain planned projects must be assessed before a formal decision to proceed can be made. It involves the collection and consideration of environmental information, which fulfils the assessment requirements of the EIA Directive and EIA Regulations, including the publication of an Environmental Statement (ES).
Environmental Statement	A document reporting the findings of the EIA and produced in accordance with the EIA Directive as transposed into UK law by the EIA Regulations.
Habitat Regulations	Conservation of Habitats and Species Regulations 2017 and Conservation of Offshore Marine Habitats and Species Regulations 2017.
Habitats Regulations Assessment	The process that determines whether or not a plan or project may have an adverse effect on the integrity of a European Site or European Offshore Marine Site.
Impact	Used to describe a change resulting from an activity via the Projects, i.e. increased suspended sediments / increased noise.
Inter-Platform Cables	Buried offshore cables which link offshore platforms.
Intertidal	Area on a shore that lies between Mean High Water Springs (MHWS) and Mean Low Water Springs (MLWS).
Landfall	The point on the coastline at which the Offshore Export Cables are brought onshore, connecting to the onshore cables at the Transition Joint Bay (TJB) above mean high water.
Offshore Development Area	The Offshore Development Area for ES encompasses both the DBS East and West Array Areas, the Inter-Platform Cable Corridor, the Offshore Export Cable Corridor, plus the associated Construction Buffer Zones.

Term	Definition
Offshore Export Cable Corridor	This is the area which will contain the Offshore Export Cables (and potentially the ESP) between the Offshore Converter Platforms and Transition Joint Bays at the landfall.
Sediment Transport	The movement of a mass of sediment by the forces of currents and waves.
Special Area of Conservation	Strictly protected sites designated pursuant to Article 3 of the Habitats Directive (via the Habitats Regulations) for habitats listed on Annex I and species listed on Annex II of the Directive.
The Applicants	The Applicants for the Projects are RWE Renewables UK Dogger Bank South (East) Limited and RWE Renewables UK Dogger Bank South (West) Limited. The Applicants are themselves jointly owned by the RWE Group of companies (51% stake) and Masdar (49% stake).
The Projects	DBS East and DBS West (collectively referred to as the Dogger Bank South Offshore Wind Farms).
Vessel Monitoring System	Satellite tracking system using a device on a vessel which transmits the location, speed and course of the vessel.

Acronyms

Acronym	Definition
AEOI	Adverse Effect on Integrity
BEIS	Business, Energy and Industrial Strategy
DBS	Dogger Bank South
EUNIS	Europe Nature Information System
HRA	Habitats Regulations Assessments
JNCC	Joint Nature Conservation Committee
MarESA	Marine Evidence-based Sensitivity Assessment
RIAA	Report to Inform Appropriate Assessment
SAC	Special Area of Conservation
UXO	Unexploded Ordnance

1 Introduction

1. Several comments within the Natural England Relevant Representation (RR 039, Appendices C and D) refer to a disagreement over the conclusions within the **RIAA (Report to Inform Appropriate Assessment Habitats Regulations Assessment Part 2 of 4** [APP-046]) on habitat damage (also sometimes referred to as habitat disturbance and covered in the RIAA in section 6.4.2.1.1 (project alone and section 6.4.2.1.2 (in-combination)). The disagreements are around the extent to which recovery occurs, the timescales for this and how this should be interpreted in the assessment (i.e. whether this contributes to the conclusion of Adverse effect on Integrity (AEOI) for the sandbank feature of the Dogger Bank Special Area of Conservation (SAC)). Fundamentally, the Applicants argue in their conclusion for this impact that the sandbank feature of the Dogger Bank SAC is no less recoverable than the sandbank features of other SACs and that Secretary of State conclusions for previous projects are applicable in this case.

2. This note provides further explanation of the Applicants' position on this issue and additional site-specific evidence of habitat recovery from within the Dogger Bank SAC (see **Appendix B - Dogger Bank B UXO crater survey results)**.

2 Background and Evidence of Recovery

3. The Dogger Bank is the largest single continuous expanse of shallow sandbank in UK, located in the middle of the North Sea, approximately 150km from the nearest coastline. The bank itself was formed by glacial processes before being submerged following sea level rise and covered with sand. The seabed over the majority of the bank within the SAC is 15-35m below current sea level. Its location in open sea and its shallow depth exposes the bank to substantial wave energy. Wave and tidal action mobilise the sandy sediment layer over the underlying hard structure of the bank itself, demonstrated by the formation of sediment ridges, particularly around the western edges of the bank (Diesing *et al.*, 2009). This hydrodynamic environment determines the biological communities that are able to live and thrive within the surface sediments. It also prevents colonisation by vegetation and a range of sessile longer-lived species which require stable sediments to survive (JNCC, 2011).

2.1 The Dogger Bank SAC

4. The Dogger Bank SAC covers 12,331km² of the shallower parts of the bank structure it was identified for its biological communities characteristic of shallow sandy sediments on sandbanks. A range of characteristic biological community types has been identified through sampling across the bank (summarised in JNCC, 2011). The communities present do not depend on the underlying structure of the bank, but on the nature of the shallow sediment layer in or on which they live. Principle factors determining community composition include an interrelated combination of sediment grain size, water depth, hydrodynamic regime and organic content – as well as interactions between species such as predation. The majority of living organisms are found either on or near the sediment surface or burrowing within the top 5-30cm. In stable fine-grained muddy sediments found in deeper or very sheltered waters burrows of some species may extend to depths of 1-2m from the surface, but such sediment conditions are not found within the Dogger Bank SAC.

5. Biological communities of sandy sediments across the SAC vary depending primarily on the sediment type and water depth. Sandy sediments vary in character across the bank and support several slightly different biological communities of infauna living within the sediment and epifauna living at the seabed surface. Sand eels *Ammodytidae sp*. occur in large numbers around the Dogger Bank, are characteristic of sandbank habitat and are an important prey resource for fish, seabirds, seals and cetaceans. Occasional, discrete areas of coarser sediments (including pebbles) have been recorded on the bank, colonised by the soft coral *Alcyonium digitatum*, the bryozoan *Alcyonidium diaphanum* and Serpulid worms – all common species characteristic of rock and stable gravels and found throughout UK waters.

6. The JNCC supplementary advice on conservation objectives for Dogger Bank SAC lists four main community types present across the SAC (JNCC, 2022). One of those community types is found in the shallower regions in the south-west of the SAC (and covers the majority of the DBS Array Areas). This sediment community is characterised by the presence of the polychaete *Nephtys cirrosa* and amphipods of the genus *Bathyporeia sp*. This community can be likened to the 'South-West Patch' community previously described prior to 2003 by Wieking and Krönke and is equivalent to the EUNIS biotope MB5233 (previous EUNIS code A5.233, UK biotope code Ss.SSa.IFiSa.NcirBat (*Nephtys cirrosa* and *Bathyporeia spp*. in infralittoral sand)).

7. Such communities typically have low numbers of individuals, low species diversity and biomass and are dominated by small, short-lived rapidly reproducing mobile species that can recolonise areas quickly following disturbance from wave and tidal action. Eggleton *et al.* (2016) found that during all years sampled between 1985 and 2014 there was high temporal similarity in species composition within the 'south-west patch', and numbers of species, individuals and diversity were considerably lower in this area in comparison with communities in slightly deeper water further to the north and east on the Dogger Bank. These impoverished communities are not unique to the Dogger Bank and have been identified within similar dynamic habitats in offshore waters in the North Sea, for example on Leman Bank within the North Norfolk and Saturn Reef SAC (Eggleton *et al.*, 2020).

2.2 Biological Community Types within the DBS Offshore Development Area

8. Within the DBS Offshore Development Area (within the Dogger Bank SAC), sediments consist of fine and medium sands with low silt content, with patches of coarser sands and gravels occurring predominantly in slightly deeper waters around the western edge of the DBS West Array Area and the southern edge of the DBS East Array Area (**Figure 9-2 Spatial Variations of Percentage of Sand, Gravel and Fines Across the Array Areas of DBS East and DBS West** [APP-086]).

9. Recent surveys conducted to inform the DBS EIA (**Appendix 9-3 - Benthic Ecology Monitoring Report** [APP-089]) recorded six habitats and associated biotopes from within the DBS Array Areas, Inter-Platform Cable Corridor and the part of the Offshore Export Cable Corridor that is within the Dogger Bank SAC (see **Appendix A - Appendix A – Habitat / Biotope Recoverability to Disturbance**). The survey confirmed previous information on biotopes and biological communities characteristic of the southern and western parts of the Dogger Bank.

10. The biological communities of the majority of the 70 samples correspond to those previously identified as the 'south-west patch' community, being dominated by small mobile amphipods and polychaete worms (biotope MB5233 *Nephtys cirrosa* and *Bathyporeia spp*. in Atlantic infralittoral sand). The coarser sediments in slightly deeper water around the western and southern edges of the Offshore Development Area within the SAC support slightly more diverse infaunal communities characteristic of these conditions (biotopes MC5212 *Abra prismatica, Bathyporeia elegans* and *polychaetes* in Atlantic circalittoral fine sand to the west and MC5214 *Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment to the west and south. See **Figure A-1** which details the locations and classifications of all sample points recorded in in the Offshore Development Area within the Dogger Bank SAC.

11. One community (biotope MC1251 Piddocks with a sparse associated fauna in Atlantic circalittoral very soft chalk or clay) found at two locations at the southern edge of the DBS East Array Area, is likely to be present as a result of erosion of sand and exposure of the underlying clay structure of the Dogger Bank.

2.3 Evidence for Recovery of Community Types from Disturbance

12. JNCC Supplementary advice on Conservation Objectives for Dogger Bank (JNCC 2022) states that for sandy mound sandbanks created by glacial processes but covered by sandy surface sediments, large scale topography or the underlying immobile substrates would not be expected to recover should they be physically impacted. The sandbank communities, however, are capable of recovering from impacts but this will be dependent on prevailing environmental conditions, the influence of human activities i.e. the scale of any current impacts, species life history traits, environmental connectivity between populations and habitat suitability. Recovery of biological communities of sandy habitats is only likely to be possible when the small scale topography and original sediment composition are restored (Boyd *et al.*, 2005 cited in Mazik *et al.*, 2015).

2.3.1 UK Government Studies

13. Baseline survey of cross-sections of sandbank habitat within offshore SACs in the southern North Sea demonstrated that the crests of sandbanks, their flanks and the troughs between the banks supported slightly different benthic communities. In general, the cleaner more mobile sands of the crests of the banks had lower numbers of surface dwelling and infaunal species, biomass, species richness and diversity than the communities of the more stable flanks and troughs (Eggleton *et al.*, 2020).

14. Fishing using bottom-contacting gears was prohibited from the whole of the Dogger Bank SAC, in summer 2022. This prohibition was put in place as sediment abrasion from bottom-contacting fishing gears was assessed to be a factor preventing the SAC from achieving its conservation objectives. Cessation of fishing with such gears should allow the sediment communities of the Dogger Bank to recover from such disturbance (JNCC, 2022).

15. The Dogger Bank is located in an exposed area in the middle of the North Sea and subject to high natural disturbance, applying in particular to the shallower areas over the top of the bank which comprise most of the Offshore Development Area within the SAC. The species that comprise the benthic communities in these shallower more hydrodynamic areas will have evolved to withstand frequent natural disturbance events. Opportunistic species dominate the benthic community and larger, sedentary and longer-lived species are less well represented. This is akin to the crest communities described by Eggleton *et al*. (2020).

16. Sampling under Defra's Natural Capital and Ecosystem Assessment programme in 2023 will contribute to monitoring the effects of the 2022 fishing closure at Dogger Bank, but the results are not yet available.

17. Diesing *et al.* (2013) modelled natural disturbance of sediments compared to disturbance from fishing in the North Sea and Channel. Results indicated that fishing disturbance was less than natural disturbance in shallow areas such as the Dogger Bank and North Norfolk sandbanks. A comparative study of benthic samples from fished and non-fished areas within the Dogger Bank SAC prior to the fishing closure could not identify significant differences in sediment communities between fished and non-fished areas (Eggleton *et al.*, 2016). Conclusions from both these studies had to rely on information on fishing location and effort from Vessel Monitoring System data, which limited confidence in their conclusions, especially when considered at a fine scale. This limitation is indicative of the challenges associated with trying to distinguish impacts of sediment disturbance (natural or otherwise) on biological communities, in particular, in very hydrodynamically active areas such as the Dogger Bank where there is high natural disturbance.

2.3.2 Offshore Wind Industry Studies

18. RPS (2019) reviewed monitoring data from numerous offshore wind farms in UK waters on behalf of The Crown Estate (e.g. Barrow, Burbo Bank, Sheringham Shoal and Robin Rigg) and collated information on how the seabed has recovered from various different impacts in various different marine conditions. The report demonstrates that areas with sandy seabed types usually recover rapidly and in full following seabed levelling and trenching. Where evidence of sandwave levelling or cable trenching does remain following cable installation this occurs in areas with higher fine sediment content (muds and silts). RPS (2019) also demonstrates that where recovery has not occurred completely in sandy habitats, these examples were limited to areas with low levels of sediment transport (i.e. less dynamic areas with low seabed mobility).

19. Monitoring undertaken at Race Bank showed that after five months either partial or full recovery had occurred at ten out of 12 monitoring locations comprising 14 out of 19 sandwaves (Orsted, 2018a) which were levelled for the Race Bank Project. Sandwaves were levelled with a swathe width of up to 210m. A further bathymetric monitoring report, including data from 2018 (two years after construction), concluded that the seabed had either completely recovered or was close to recovering to pre-construction levels along most of the nine monitoring locations that were selected (Orsted, 2018b). The seabed in this case was between 4 and 14m below LAT. Orsted (2018a) concluded that the Race Bank data provided evidence of recovery but that in cases where waters were deeper recovery would likely take longer due to the reduced influence of wave effects at the seabed (from months to years). For the Dogger Bank South projects, sandwave levelling is estimated to require a swathe width of between 25 – 70m centered on each cable route in waters up to approximately 35m within the Dogger Bank SAC.

2.3.3 Evidence from the Dogger Bank

20. There is limited direct evidence of recovery from offshore wind activities within the Dogger Bank SAC itself, however where data are available these show rapid recovery of the physical structure of the surface sediments:

- The Applicants commissioned a geophysical survey to look at potential recovery of the seabed following the installation and removal of two met masts (monopiles on 15m diameter suction caissons) which were located in the Dogger Bank Wind Farm zone between 2013 and 2017 in the Dogger Bank B and Dogger Bank C wind farms (see Appendix 8-2 Met Mast Survey Analysis [APP-083]). A comparison of pre-installation and post removal geophysical survey data was undertaken. The analysis showed no significant seabed features resulting from the presence of met masts (which had been in place for four years prior to decommissioning) and showed that trawl marks and localised depressions visible in the pre-installation

surveys had infilled over the 10-year period since installation of the met masts in 2013.

- Dogger Bank B undertook monitoring of craters caused by high-order UXO clearance in 2023 (Dogger Bank B, 2023). The UXO clearance campaign was completed in February-March 2023, with a survey of the craters in June 2023 at five of six clearance locations. Survey showed that in all cases the craters had infilled rapidly, in some cases infilling was largely complete, and even where there was the least recovery in (DBB_027) a 0.8m crater infilled to approximately 0.4m depth (see Appendix B - Dogger Bank B UXO crater survey results).

21. Whilst these examples only consider the physical structure of the sandbank, given the absence of physical barriers to communities re-establishing post-construction (other than in locations of above-surface infrastructure), ecological recovery is likely as the Dogger Bank communities typically have low numbers of individuals, low species diversity and are dominated by small, short-lived rapidly reproducing mobile species that can recolonise areas quickly following disturbance.

22. Sensitivity of the habitats and biotopes identified within the DBS Offshore Development Area from the RWE survey in 2023 was assessed using the Marine Evidence-based Sensitivity Assessment (MarESA) approach as part of the Environmental Assessment process (**Chapter 9 Benthic and Intertidal Ecology** [APP-085]). The MarESA approach was developed by the Marine Biological Association with support from the UK conservation agencies including Natural England and JNCC (Tyler-Walters *et al.*, 2023). Academic literature is reviewed to compile evidence on the biology and ecology of species and habitats to systematically assess their likely sensitivity to anthropogenic pressures. Part of that process assesses recoverability (or resilience) of the habitat or species based on life history of species and their ecology.

23. Recoverability of the six biotopes identified from the survey that are within the DBS Offshore Development Area within Dogger Bank SAC is compiled in Appendix A of this report and summarised below:

- Shallow sediment biotope types present over the majority of the Offshore Development Area were assessed to have High recoverability, i.e. full recovery within 2 years of disturbance.
- Coarser sediments in deeper waters at the edges of the Dogger Bank in the west of the DBS West Array Area and the south of the DBS East Array Area were assessed as either high (full recovery within 2 years) or medium (full recovery within 2-10 years) depending on the type of abrasion pressure.
- One biotope type consisting of clay with burrows and identified at two locations at the far southern extremity of the DBS East Array Area, is identified as having very low recovery from habitat disturbance and unlikely to recover within 25 years.

24. In summary, survey evidence from the Dogger Bank and interpretation of the recoverability of biotopes using the MarESA approach suggests that the majority of communities within the DBS Offshore Development Area within Dogger Bank SAC would have high recovery rates.

2.4 Recovery of Sandeel Populations

25. Lesser and greater sandeel species (*Ammodytes marinus* and *Hyperoplus lanceolatus*) are widespread in UK waters, particularly the North Sea. Prior to the 2022 closure of the Dogger Bank to bottom contacting fishing gears there was an industrial fishery for these species in UK waters focussed around the western slopes of the Dogger Bank including much of the Offshore Development Area. Sandeel have a close association with the sandy sediments into which they burrow to depths of 20-50 cm. Larvae are planktonic and after settlement adults are largely stationary and show a strong preference for sediments composed of medium and coarse sands and avoid sediments containing more than 4% silt. During the spring and summer, sandeel emerge during the day to feed in schools and at night return to bury in the sand (Wright *et al.*, 2000; Holland *et al.*, 2005).

26. The recruitment and recoverability of sandeel populations is driven by oceanographic factors such as temperature and plankton availability, but also by the availability of suitable clean sands with low silt content. Following any disturbance of sediments due to construction of the windfarm, timescale for recovery will be dependent on availability of suitable sediment (i.e. without raised silt content), the size of the remaining population within the recovery area, rates of recruitment and mortality, and immigration from outside the area of impact. Given ideal conditions, noticeable changes in population size within a depleted area could be apparent after 4-6 years assuming 50 % of the individuals are sexually mature after 2 years and therefore recruitment from the following cohort will recruit after another 2 years (Mazik *et al.*, 2015).

27. **RIAA Appendix B – Sandeel Habitat Potential in the Dogger Bank SAC and Southern North Sea SAC** [APP-050] presents an overview of sandeel habitats across the SAC (based upon modelling of the potential for habitat to be suitable for sandeel) considering impact footprints of the Projects in the context of the SAC and also the wider Southern North Sea. The worst case for activities that may result in abrasion / disturbance of the seabed will be during the construction phase of the Projects. The activities are estimated to impact approximately 31.4km² within DBS East and DBS West Array Areas combined, representing 0.23% of the medium to high potential habitat for sandeel of the SAC.[1]

[1] It should be noted that the Applicants have proposed changes to the Projects' Design Envelope which would reduce the footprint of abrasion / disturbance of the seabed to 28.4km². This change will be detailed in the Project Change Request – Environmental Assessment Update [document reference: TBC]. It is expected that the change request will be submitted in mid-January 2025 following targeted consultation.

3 Determination of Adverse Effect from Previous Projects

28. The Hornsea Project Three offshore export cables crossed the North Norfolk Sandbanks and Saturn Reef SAC. The SAC is designated for Annex I Sandbanks and Annex I Reefs. The area predicted to be impacted was up to approximately 9.3km², approximately 0.26% of the SAC.

29. The conservation status of the site was not favourable and the objective for this site was to restore sandbanks to favourable condition by restoring their extent and distribution, structure and function and any supporting processes upon which they rely.

30. Hornsea Project Three argued in their application that temporary impacts from export cable installation within the SAC would not lead to adverse effect on integrity. This point was discussed during the examination of that project, and evidence from the Race Bank project (Orsted, 2018a, 2018b, see section 2.3.2) was presented to demonstrate recovery from, in particular, sandwave levelling. Detailed consideration of this issue contributed to the Secretary of State's decision on AEOI in this case (BEIS, 2020)

31. Natural England agreed with Hornsea Project Three that the Race Bank monitoring provided some confidence that sandwaves would recover, but questioned its applicability and whether the same conclusions apply within the North Norfolk Sandbanks and Saturn Reef SAC (BEIS, 2020). Natural England advised that whilst the extent of the potential impact was unclear, the extent of sandwave levelling was such that it could not be considered de minimis (BEIS, 2020). The Secretary of State concluded that monitoring undertaken by other projects, at other locations does not guarantee that identical results would occur elsewhere for similar activities in similar habitats; no two sites are identical and that any decision made is to be done so on the best available scientific evidence and not absolute certainty and without the use of existing monitoring data informed decisions cannot be made (BEIS, 2020).

32. Ultimately the Secretary of State concluded that:

"The Secretary of State recognises that the site [the North Norfolk Sandbanks and Saturn Reef SAC] has an unfavourable conservation status arising in part from human activities and that the conservation objectives for the site include the need to restore the sandbank feature to favourable condition. The Secretary of State considers that there is sufficient evidence to indicate that sandwaves will start to recover shortly after cable laying has been completed and cable installation will not reduce the conservation status of the sandbanks or delay the achievement of favourable status. Consequently, the Secretary of State is satisfied that the potential for impacts on Annex I sandbank features from cable

installation resulting from the Project alone would not represent an adverse effect upon the conservation objectives of the North Norfolk Sandbanks and Saturn Reef SAC."

33. The Applicants consider this case is highly relevant to the projects and the conclusions of the RIAA (**Report to Inform Appropriate Assessment Habitats Regulations Assessment Part 2 of 4** [APP-046]), given:

- This pertains to the same feature (sandbanks);
- The quantum of impact is similar to the Projects (0.26% of the SAC);
- The feature is considered to be in unfavourable condition with a restore objective; and
- Evidence of recovery from the feature elsewhere was considered in the conclusion.

34. In addition, the Applicants note that similar conclusions were reached for both the Norfolk Boreas and Norfolk Vanguard Projects (BEIS, 2021, 2022) where again, in spite of the unfavourable condition of the sandbank feature of the Haisborough, Hammond and Winterton SAC, the Secretary of State concluded no AEOI on the feature from temporary construction impacts.

35. The Applicants accept that in the three cases cited above, the sandbank feature was considered to be 'an active and highly dynamic environment', however highlight the evidence from sections 2.2 and 2.3 (in particular in situ evidence in section 2.3.3) that recovery is likely to be rapid within the Dogger Bank also.

4 Plan Level HRA and Compensation Plan and Natural England Advice

36. Limited evidence was provided in the Plan Level process for how abrasion / disturbance of the seabed should be considered. The Plan Level RIAA (The Crown Estate, 2022a)[2] states that:

"The Secondary Assessment has calculated the impact from the Round 4 Plan alone to be 32.209km², which equates to 0.261% of this features distribution within this Protected Site. This is due to the footprint of subsea infrastructure required for Preferred Projects 1 and 2. This impact will be a long-term impact (which is currently expected to be up to 60 years) on the feature's extent and distribution (currently in unfavourable condition). Following installation this feature will have limited potential to recover, and the feature is already in unfavourable condition. Such an impact would delay restoration, which would be contrary to the Conservation Objectives of this SAC."

37. This is the sole basis upon which The Crown Estate conclude adverse effect on integrity. No evidence is presented for the 'limited potential to recover'. The Applicants note that the Plan Level HRA documentation makes limited mention of supporting functions of the Dogger Bank SAC in terms of provision of prey species (The Crown Estate, 2022b), the assessment therefore is purely in terms of footprint upon the seabed. The Plan Level RIAA (The Crown Estate, 2022a) notes the conclusion from the Hornsea Project Three HRA, but seems to conflate habitat loss and habitat damage within its interpretation of that decision.

38. The Applicants note that the Plan level HRA states the following (The Crown Estate, 2022c):

"The Crown Estate is satisfied that the approach to uncertainties adopted by the RIAA is appropriate, namely that where meaningful assessment cannot be undertaken at plan level (owing to this absence of key information), reliance can be placed on the project-level assessment (specifically at the lower the project-level HRA). This is on the basis that project-level HRA:

- *Will be required as a matter of law at that stage;*
- *Will need to identify and assess the magnitude of all LSEs including those effects identified at plan level which are affected by uncertainty;*
- *Will be able to determine and secure, where necessary, appropriate and feasible mitigation measures;*

[2] Note that all references to footprints in the Plan Level HRA refer to values assumed during that process and subsequently refined during the Project level EIA, although these have change, however they do not change the substance of the arguments.

- *Will be able to more precisely identify the nature timing, duration, scale or location of development, based on further detailed information and data, and therefore will be able to ascertain with more certainty the magnitude of the effects of each project to enable an AEOSI to be avoided."*

39. The Applicants opinion, therefore, is that the conclusions of the Plan Level HRA may be superseded by Project Level assessments where more detailed information is available. The Applicants note that in the case of guillemot at Flamborough and Filey Coast Special Protection Area, for example, the Plan Level HRA concluded no adverse effect (either for the Plan alone or in-combination) but this conclusion is unlikely to be upheld at the project Level given that decisions made by the Secretary of State subsequent to the Plan Level HRA concluded AEOI for that feature. The Applicants consider that it would be unreasonable to only update Plan Level HRA conclusions in a negative way in response to information which '*more precisely identify the nature timing, duration, scale or location of development, based on further detailed information and data, and therefore will be able to ascertain with more certainty the magnitude of the effects of each project'.*

40. The Dogger Bank Strategic Compensation Plan paragraphs 3.1.3 and 3.1.4 (**Round 4 Dogger Bank Strategic Compensation Plan** [APP-060]) states the following (noting that although the following is described as recovery from loss the text appears in relation to habitat damage) (emphasis added):

"The impact of habitat loss was considered in the Report to Inform Appropriate Assessment (RIAA) as effectively a permanent impact since it would persist for the lifetime of the Round 4 projects, specifically Dogger Bank South West and Dogger Bank South East, which is currently expected to be as long as the impact persists, up to 60 years (the duration of the lease). Recovery from habitat damage would be expected (e.g. BEIS, 2019) but the Round 4 Plan Level HRA recognised that sandy mound sandbanks such as Dogger Bank have limited recovery ability compared to more dynamic current tidal sandbanks. For this reason, habitat damage was included as part of the reason behind the conclusion of Adverse Effects of Special Interest (AEOSI) of the sandbank feature of Dogger Bank SAC, alongside habitat loss.

The habitat damage value represents the seabed area expected to be affected by activities such as cable burial (where not followed by rock protection, for which habitat loss is assumed), placement of temporary anchors and jack-up barge legs etc. Habitat recovery from damage would be expected (e.g. BEIS, 2019) but the Round 4 Plan Level HRA recognised that sandy mound sandbanks such as Dogger Bank have limited recovery ability compared to more dynamic current tidal sandbanks. Recovery from habitat loss would not occur until decommissioning has been completed, and, may take 10-25 years (based on Natural England's advice). Such impacts would delay restoration which would be contrary to the conservation objectives of this the Dogger Bank SAC. This

impact can be reduced with mitigation that limits the extent of infrastructure within the SAC, but not to levels at which an AEOSI can be discounted."

41. Natural England were asked by the Applicants during The Crown Estate Strategic Compensation Steering Group meetings to provide evidence for the above position on duration of recovery (i.e. 10 – 25 years), and no evidence has been provided to date or has been put forward within their Relevant Representation.

42. Within their Relevant Representation Natural England provide the following advice (Annex C1). This is in relation to small-scale habitat loss, not damage, but is the fullest articulation to date by Natural England of how adverse effect on integrity could be concluded.

"Whilst there are no hard and fast rules or thresholds, in order for Natural England to advise that there is no likelihood of an adverse effect the Applicant would need to demonstrate the following:

1) That the loss is not on the priority habitat/feature/ sub feature/ supporting habitat; and/or

2) That the loss is temporarily and reversible (within guidelines above); and/or

3) That the scale of loss is so small as to be de minimus alone and/ or

4) That the scale of loss is inconsequential including other impacts on the site/ feature/ sub feature"

43. It is the Applicants' opinion that the question of recovery is a particularly important issue to consider, given the implications for compensation in the event of a conclusion of AEOI from the Secretary of State and the uncertain position on compensation ratios reached by Dogger Bank Strategic Compensation Plan (Round 4 Dogger Bank Strategic Compensation Plan [App-060]). The plan states that (paragraph 6.2.6):

"In summary, the Steering Group do not agree that a simple value (e.g. 25%) to represent required level of compensation for damage can currently be supported. Whilst some value below 100% is likely to be justified, (Natural England indicated during consultation that the habitat recovery time of Dogger Bank is 10 to 25 years), further study to develop a robust figure will be required. In the absence of this the compensation level for habitat damage should be considered as 1:1 in line with the precautionary principle."

44. The Applicants' view is that there will be no AEOI in relation to habitat disturbance/damage and compensation for this effect is unnecessary. However, if AEOI is determined by the Secretary of State, any compensation requirement must take into account evidence of recovery as stated in the Dogger Bank Strategic Compensation Plan (quoted above). At present, it is the Applicants' understanding that the Defra-led process (to which they are not parties) is considering the scale of compensation required for strategic needs. As stated by Natural England in their Relevant Representation (Appendix D of RR-039):

"Information on the expected impacts of OWF projects on designated habitats has been collected from developers and the DEFRA team will be taking this into account when developing the proposals, alongside advice from SNCBs on ecological viability, ratios and any management measures that may be required. Ultimately it will be for DEFRA to determine the amount of compensation required, irrespective of what the Applicant has detailed in Section 5 Compensation Quantum."

45. The Applicants are concerned that an over-precautionary approach to the quantum of compensation could undermine the justification for any site put forward for designation as strategic compensation measure and delay the implementation of the compensation.

5 Conclusions

46. The Plan level HRA and Natural England advice assert that the communities of the Dogger Bank SAC are unlike those of other sandbanks within SACs and will take a long time to recover from disturbance (10 -25 years). No evidence has been provided for this position.

47. The Applicants' evidence on the recoverability of sediment communities in the Dogger Bank SAC come from several sources:

- The biotopes recorded in the site-specific surveys are all stated to have high (full recovery within two years) or medium (full recovery within 2 – 10 years) recovery rates, using the MarESA sensitivity criteria which are supported by JNCC and Natural England.[3]
- Evidence from site specific survey from offshore wind developments within the SAC demonstrate rapid recovery from construction effects (see **Appendix B - Dogger Bank B UXO crater survey results**) and recovery from longer-term operational effects (see **Appendix 8-2 Met Mast Survey Analysis** [APP-083])
- Evidence from industry studies of recovery of habitats (RPS, 2019, Orsted, 2018a, 2018b).
- UK Government studies which describe the sandy habitats characteristic of the Dogger Bank as being typified by fauna that are adapted to high rates of mortality and natural disturbance (Eggleton *et al.*, 2016). This study (which was of the effects of fishing activity on the Dogger Bank), found that faunal communities did not noticeably differ along an abrasion pressure gradient.

48. There is no evidence to indicate that recovery of the sediment communities at Dogger Bank would be any more limited than on sandbanks formed by tidal currents such as those within other SACs in the southern North Sea. Recovery of biological communities would be likely to start to occur within individual damaged areas as soon as the sediment characteristics in that area are restored following construction. The Applicants maintain the position that the Plan Level HRA, did not adequately address recovery, irrespective of whether its conclusions are 'signed off'.

49. All of the above suggest that recovery will take place and that this needs to be considered within any conclusions on AEOI. The Applicants have therefore considered the criteria for small-scale habitat loss provided by Natural England in their Relevant Representation and provided commentary on each point (see **Table 5-1**).

[3] The exception to this is the piddock habitat which was picked up in site specific survey. The Applicants note that the presence of piddock habitat within the Dogger Bank is potentially the result of bottom contacting fisheries removing overlaying sediments and exposing suitable substrates for the piddocks. This habitat is not mentioned in the site selection documentation (JNCC, 2011) or the Supplementary Advice on Conservation Objectives (SACO) for Dogger Bank (JNCC, 2022). This habitat is not a recognised feature of sandbanks. Recovery of the sandbank feature as a result of the cessation of fisheries within the SAC may well lead to the loss of the piddock habitat.

50. In conclusion, the Applicants maintain the position that given the evidence for recovery, the situation for habitat damage in the Dogger Bank SAC is no different from that of Hornsea Project Three and the North Norfolk Sandbanks and Saturn Reef SAC, or Norfolk Boreas and Norfolk Vanguard Projects and the Haisborough, Hammond and Winterton SAC. Habitat damage therefore should not contribute to the conclusion of AEOI for the Dogger Bank SAC sandbank feature.

Table 5-1 The Applicants commentary on Natural England Criteria for consideration of small-scale habitat loss with SACs in relation to AOEI.

Criterion	Response
Whilst there are no hard and fast rules or thresholds, in order for Natural England to advise that there is no likelihood of an adverse effect the Applicants would need to demonstrate the following	n/a
That the loss is not on the priority habitat/feature/ sub feature/ supporting habitat; **and/or**	All seabed within the SAC is considered to be Annex 1 sandbank – whether this criterion is relevant is therefore dependent upon interpretation of the 'and/or' This is the same situation as for North Norfolk Sandbanks and Saturn Reef SAC the entire SAC is designated and viewed as an Annex I sandbank system (BEIS, 2020)
That the loss is temporarily [sic] and reversible (within guidelines above); **and/or**	The Natural England advice states *"for loss to be considered temporary it must be clearly time limited to the point where the impact is predicted to return to the same pre-impact condition and must include a detailed remediation plan using proven techniques as part of the licence."* The Applicants contend that all of the evidence summarised in **paragraph 47** show that recovery will be full, and occur well below the 25 year timescales Natural England has suggested for the Dogger Bank. Remediation is not considered necessary given the dynamic nature of the habitats and evidence of natural recovery.
That the scale of loss is so small as to be de minimis alone **and/ or**	There is no agreement on scale of impact in qualitative terms, the Applicants maintain that the disturbance effect at 0.2% of the area of the SAC (as a worst case) would qualify as de-minimis. Note that Natural England's advice for Hornsea Project Three (see **paragraph 31**) was that the impacts were not de minimis, nevertheless SoS concluded no AEOI. The scale of

Criterion	Response
	impact from the Projects is similar to Hornsea Project Three (0.2% for the Projects compared with 0.26% for Hornsea Project Three).
That the scale of loss is inconsequential including other impacts on the site/ feature/ sub feature	As stated in paragraph 20 of the RIAA **(Report to Inform Appropriate Assessment Habitats Regulations Assessment Part 2 of 4** [APP-046]), fisheries impacts were considered to have affected 8,700km² of the SAC seabed (70.5% of the SAC) in 2016 alone. This demonstrates the difference in magnitude of these effects, acknowledging that bottom contacting fisheries are now prohibited within the SAC.As such the Applicants consider the scale of loss to be inconsequential.

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Appendix A – Habitat / Biotope Recoverability to Disturbance

51. **Table A-1** details the habitats identified in the ES as observed (June 2023) within the proposed Array Areas, Inter-Platform Cable Corridor and the offshore part of the Offshore Export Cable Corridor (after Tables 9-12 and 9-15 in **Chapter 9 Benthic and Intertidal Ecology** [APP-085]). Habitats are listed in order of most to least commonly identified biotope, described in relation to the Dogger Bank SAC, and recoverability to types of disturbance is listed according to MarESA assessments. **Figure A-1** details the locations and classifications of all sample points recorded in in the Offshore Development Area within the Dogger Bank SAC.

Table A-1 Habitats Identified During Site Specific Surveys Within the Dogger Bank SAC and Potential Recoverability to Disturbance

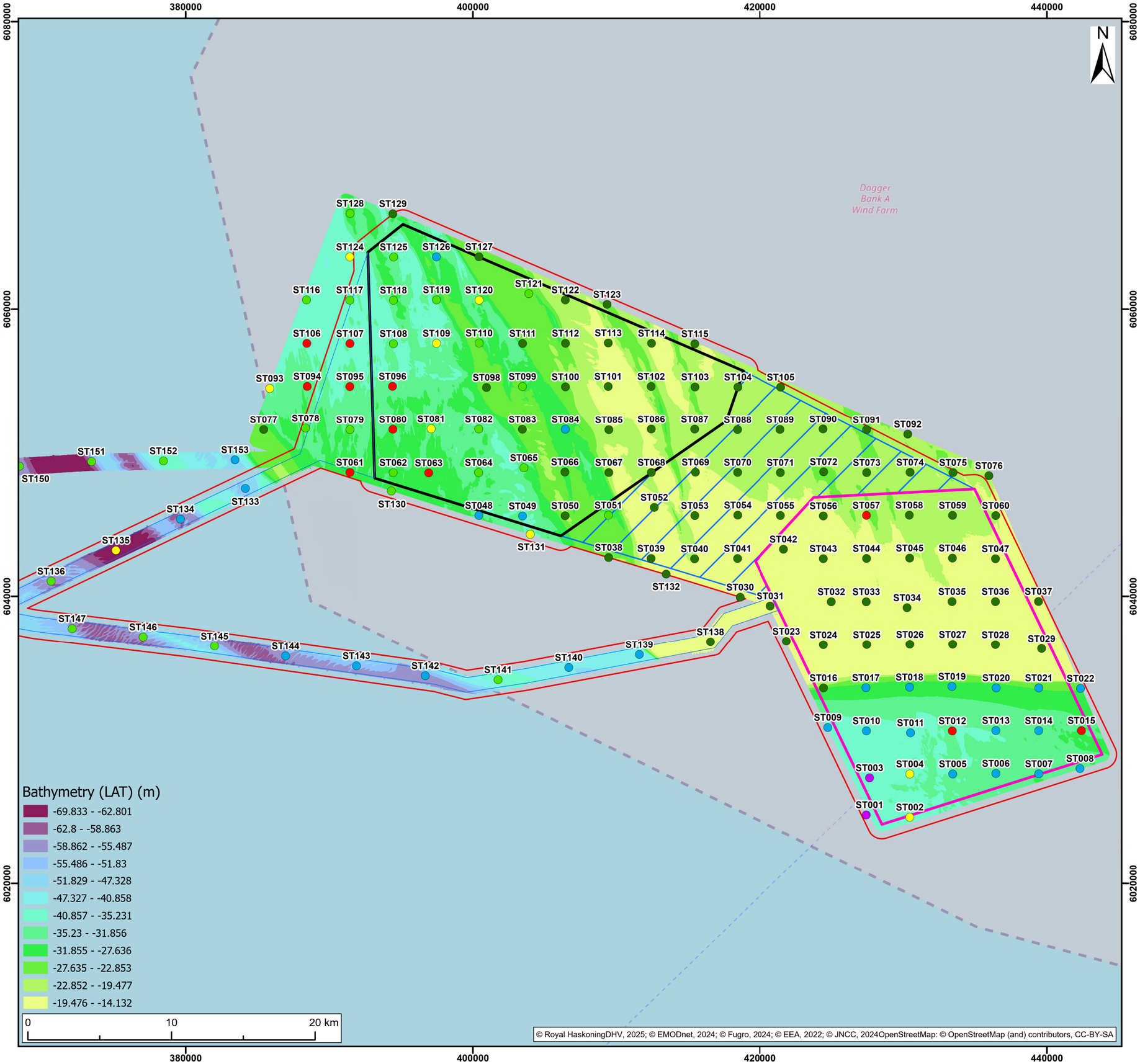
EUNIS (EEA, 2022) Habitat Classification (Equivalent EUNIS 2007 and JNCC 2023 codes)	Description of distribution of biotope/habitat within the Offshore Development Area (7.9 ES Chapter 9)	Recoverability from removal of substratum (extraction)	Recoverability from abrasion/surface disturbance	Recoverability from subsurface disturbance
Habitats/Biotopes Located Identified Within the Dogger Bank SAC				
MB5233 *Nephtys cirrosa* and *Bathyporeia spp.* in Atlantic infralittoral sand (A5.233 or SS.SSa.IFiSa.NcirBat)	Occurred at 70 stations across the entirety of the Inter-Platform Cabling Corridor and the majority of both Array Areas with the exception of the southern half of DBS East and the western reaches of DBS West. This biotope was typical of the shallower parts of the top of the Dogger Bank itself.	High (Full recovery within 2 years)	High (Full recovery within 2 years)	High (Full recovery within 2 years)
		The following is reproduced from MarESA https://www.marlin.ac.uk/habitats/detail/154/nephtys_cirrosa_and_bathyporeia_spp_in_infralittoral_sand ***Resilience assessment***. *As a consequence of the dynamic nature of the habitat the faunal component of the biotope is very sparse and low in species richness. Therefore, the community might be considered 'mature' only a few days or weeks after the last storm event, as the mobile species displaced from the biotope and those from adjacent area colonize the substratum via the surf plankton. Even following severe disturbances recovery would be expected to occur within a year; biotope resilience is therefore assessed as 'High' for any level of impact (e.g. where resistance is 'None', 'Low' or 'Medium').* **Consideration in the assessment** It is evident from the text reproduced above that recovery will be rapid. Whilst 'resistance' to construction activity is clearly none or low, the ability of mobile fauna to return from surrounding area and their reproductive capacity mean that resilience is high and sensitivity low. MasrESA even state that 'severe' disturbance would be recoverable within a year. MarESA states that "*This assessment may underestimate sensitivity to high-levels of abrasion (repeated events within a short period).*" However, for the vast majority of locations across the array there will only be a single disturbance event during construction. In the case of cables for example, once the cable is installed physical recovery will commence. There is no need for repeat disturbance at that location unless remedial work is required, either during construction or for the operational lifetime. Likewise for turbines whilst the initial disturbance footprint is large (if seabed preparation is required) subsequent disturbance is limited to the jack-up footprint. Therefore, there is no need to consider repeated disturbance events		
MC5212 A*bra prismatica, Bathyporeia elegans* and polychaetes in circalittoral fine sand (A5.252 or SS.SSa.CFiSa.ApriBatPo)	Occurred at 46 stations primarily in the western extent of the DBS West Array Area and comprised the majority of samples recorded along the Offshore Export Cable Corridor, up to 43km from the landfall. This biotope is typical of the slightly deeper fine sand areas around the edges of the Dogger Bank itself.	Medium (Full recovery within 2-10 years)	High (Full recovery within 2 years)	High (Full recovery within 2 years)
		The following is reproduced from MarESA https://www.marlin.ac.uk/habitats/detail/1133/abra_prismatica_bathyporeia_elegans_and_polychaetes_in_circalittoral_fine_sand ***Resilience assessment***. *Where resistance is 'None' or 'Low' and an element of habitat recovery is required, resilience is assessed as 'Medium' (2-10 years), based on evidence from aggregate recovery studies in similar habitats including Boyd et al. (2005). Where resistance of the characterizing species is 'Low' or 'Medium' and the habitat has not been altered, resilience is assessed as 'High' as, due to the number of characterizing species and variability in recruitment patterns, it is likely that the biotope would be considered representative and hence recovered after two years although some parameters such as species richness, abundance and biotopes may be altered. Recovery of the seabed from severe physical disturbances that alter sediment character may also take up to 10 years or longer (Le Bot et al., 2010), although extraction of gravel may result in more permanent changes and this will delay recovery.* **Consideration in the assessment** Other than where the substratum is removed (which is really intended to represent aggregate extraction and is not a realistic impact for the Projects) recovery will be rapid. It is not considered that the construction activities would 'alter the sediment character' given that most disturbance would be of the		

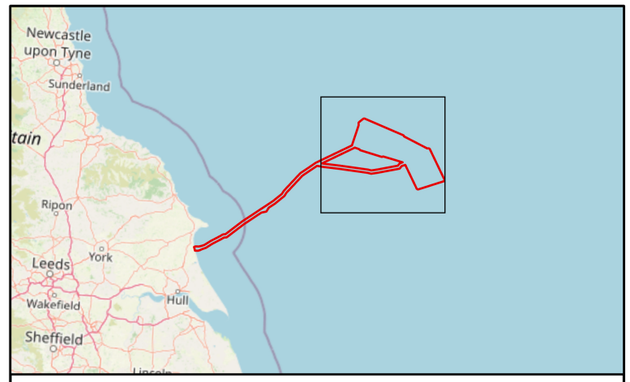
EUNIS (EEA, 2022) Habitat Classification (Equivalent EUNIS 2007 and JNCC 2023 codes)	Description of distribution of biotope/habitat within the Offshore Development Area (7.9 ES Chapter 9)	Recoverability from removal of substratum (extraction)	Recoverability from abrasion/surface disturbance	Recoverability from subsurface disturbance
		surface and near-surface sediments. Other than where there is placement of surface infrastructure there is no barrier to fauna from surrounding areas moving to recovering areas. MarESA states *Abrasion is likely to damage epifauna and flora and may damage a proportion of the characterizing species, biotope resistance is therefore assessed as 'Medium'. Resilience is assessed as 'High' as opportunistic species are likely to recruit rapidly and some damaged characterizing species may recover or recolonize. Biotope sensitivity is assessed as 'Low'.* *Penetration or disturbance of the substratum subsurface - The trawling studies and the comparative study by Capasso et al. (2010) suggest that the biological assemblage present in this biotope is characterized by species that are relatively tolerant of penetration and disturbance of the sediments. Either species are robust or buried within sediments or are adapted to habitats with frequent disturbance (natural or anthropogenic) and recover quickly. The results suggest that a reduction in physical disturbance may lead to the development of a community with larger, more fragile species including large bivalves. Biotope resistance is assessed as 'Medium' as some species will be displaced and may be predated or injured and killed. Biotope resilience is assessed as 'High' as most species will recover rapidly and the biotope is likely to still be classified as the same type following disturbance. Biotope sensitivity is therefore assessed as 'Low'.* Whilst it is accepted that there are some longer lived species (i.e. bivalve) that make take longer to recover, it is noted that '*the biotope is likely to still be classified as the same type following disturbance'.* In addition, Tyler-Walters *et al* (2023) state *Full recovery is defined as the return to the state of the habitat that existed prior to impact. This does not necessarily mean that every component species has returned to its prior condition, abundance or extent but that the relevant functional components are present and the habitat is structurally and functionally recognisable as the initial habitat of interest. It should be noted that the recovery rates are only indicative of the recovery potential.* As per the assessment for MB5233 *Nephtys cirrosa* and *Bathyporeia spp.* in Atlantic infralittoral sand, it is not considered that repeated disturbance is relevant and therefore does not affect recovery.		
MC5214 *Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment (A5.261 or SS.SSa.CMuSa.AalbNuc)	Occurred at 31 stations primarily in the southern extent of the DBS East Array Area, in isolated locations within the DBS West Array Area, the DBS East branch of the Offshore Export Cable Corridor. This biotope is typical of the slightly deeper fine, slightly muddy sand areas around the edges of the Dogger Bank itself.	Medium (Full recovery within 2-10 years)	High (Full recovery within 2 years)	High (Full recovery within 2 years)
		As per MC5212 A*bra prismatica, Bathyporeia elegans* and polychaetes in circalittoral fine sand https://www.marlin.ac.uk/habitats/detail/62/abra_alba_and_nucula_nitidosa_in_circalittoral_muddy_sand_or_slightly_mixed_sediment **Consideration in the assessment** The evidence provided by MarESA is the similar to that presented for MC5212, which is to be expected given the similarities between them, our rationale for consideration within the assessment is therefore the same		
MC3215 *Branchiostoma lanceolatum* in Atlantic	Occurred at 11 stations primarily towards the	Medium (Full recovery within 2-10 years)	High (Full recovery within 2 years)	Medium (Full recovery within 2-10 years)

EUNIS (EEA, 2022) Habitat Classification (Equivalent EUNIS 2007 and JNCC 2023 codes)	Description of distribution of biotope/habitat within the Offshore Development Area (7.9 ES Chapter 9)	Recoverability from removal of substratum (extraction)	Recoverability from abrasion/surface disturbance	Recoverability from subsurface disturbance
circalittoral coarse sand with shell gravel (A5.145 or SS.SCS.CCS.Blan)	western edge of the DBS West Array Area and isolated locations within DBS East. This biotope is typical of the slightly deeper, more tide-swept coarse sand areas around the edges of the Dogger Bank itself.	***The following is reproduced from MarESA*** https://www.marlin.ac.uk/habitats/detail/244/branchiostoma_lanceolatum_in_circalittoral_coarse_sand_with_shell_gravel ***Resilience assessment***. *Branchiostoma is likely to recruit as adults from surrounding habitats due to its mobility, where the impact footprint is small (resistance is assessed as 'Medium'), recovery in this instance will be assessed as 'High'. Where resistance is 'None' or 'Low' recovery may depend on reproduction and migration and resilience is assessed as 'Medium'.* **Consideration in the assessment** Other than where the substratum is removed (which is really intended to represent aggregate extraction and is not a realistic impact for the Projects) recovery will be rapid. It is not considered that the construction activities would 'alter the sediment character' given that most disturbance would be of the surface and near-surface sediments. Other than where there is placement of surface infrastructure there is no barrier to fauna from surrounding areas moving to recovering areas. This biotope is characterized by the presence of the Cephalochordate *Branchiostoma lanceolatum.* As members of this ecological group are generally buried within the sediment this will provide some protection. MarESA highlights that this species can regenerate portions, particularly parts of the tail and recover from injuries and recovery of impacted populations may occur through recovery of damaged individuals, migration of adults or by colonization by planktonic larva and that evidence suggests that recolonization of disturbed habitats by *B. lanceolatum* can be rapid. As per the assessment for MB5233 *Nephtys cirrosa* and *Bathyporeia spp.* in Atlantic infralittoral sand, it is not considered that repeated disturbance is relevant and therefore does not affect recovery.		
MC3 Circalittoral coarse sediment A5.15 or CCS (MC3211 *Pomatoceros triqueter* with barnacles and bryozoan crusts on Atlantic circalittoral unstable cobbles and pebbles used as proxy for recoverability assessment)	Found in eight isolated samples in the DBS West Array Area, two locations at the southern extent of the DBS East Array Area and in one location in the Offshore Export Cable Corridor. All locations occur in slightly deeper, more tide-swept areas around the south western edges of the Dogger Bank itself.	High (Full recovery within 2 years)	High (Full recovery within 2 years)	High (Full recovery within 2 years)
		The following is reproduced from MarESA https://www.marlin.ac.uk/habitats/detail/177/spirobranchus_triqueter_with_barnacles_and_bryozoan_crusts_on_unstable_circalittoral_cobbles_and_pebbles ***Resilience assessment.*** *This biotope is considered to have a high recovery potential. Sebens (1985, 1986) noted that calcareous tube worms, encrusting bryozoans and erect hydroids and bryozoans covered scraped areas within four months in spring, summer and autumn. Most of the epifauna is probably subject to severe physical disturbance and scour during winter storms and probably develops annually, through recolonization from any surviving individuals and from adjacent habitats. Therefore, recovery is likely to be very high; the biotope develops within less than a year and probably no more than six months in spring and summer. Where resistance is 'High', resilience is assessed as 'High' by default. Bryozoans, Balanus crenatus and Spirobranchus triqueter are rapid colonizers and are likely to recover quickly, probably within months. Therefore, the resilience, of these species, is assessed as 'High' for any level of perturbation (resistance).* **Consideration in the assessment** It is evident from the text reproduced above that recovery will be rapid given that '*the resilience, of these species, is assessed as 'High' for any level of perturbation'* As per the assessment for MB5233 *Nephtys cirrosa* and *Bathyporeia spp.* in Atlantic infralittoral sand, it is not considered that repeated disturbance is relevant and therefore does not affect recovery.		
		Very low	Very low	Very low

EUNIS (EEA, 2022) Habitat Classification (Equivalent EUNIS 2007 and JNCC 2023 codes)	Description of distribution of biotope/habitat within the Offshore Development Area (7.9 ES Chapter 9)	Recoverability from removal of substratum (extraction)	Recoverability from abrasion/surface disturbance	Recoverability from subsurface disturbance
MC1251 Piddocks with a sparse associated fauna in Atlantic circalittoral very soft chalk or clay (A4.231 or CR.MCR.SfR.Pid)	Found at two locations at the southernmost corner of the DBS East Array Area. This was in association with the biotope *Abra alba* and *Nucula nitidosa* (MC5214) in circalittoral muddy sand or slightly mixed sediment.	(Negligible or prolonged recovery possible; at least 25 years to recover structure and function)	(Negligible or prolonged recovery possible; at least 25 years to recover structure and function)	(Negligible or prolonged recovery possible; at least 25 years to recover structure and function)
		With regard to piddocks, note that the **Draft DCO (Revision 5)** [REP1-004] includes a provision to micro-site and avoid impacts upon this feature.		
Habitats/Biotopes Located Identified Outside of the Dogger Bank SAC				
MC3212 *Mediomastus fragilis, Lumbrineris spp.* and venerid bivalves in Atlantic circalittoral coarse sand or gravel (A5.142 or SS.SCS.CCS.MedLumVen)	Found at five locations in inshore waters in a stretch of the Offshore Export Cable Corridor. Not found within the DB SAC.	High (Full recovery within 2 years)	High (Full recovery within 2 years)	High (Full recovery within 2 years)
		As per MC5212 A*bra prismatica, Bathyporeia elegans* and polychaetes in circalittoral fine sand https://www.marlin.ac.uk/habitats/detail/382/mediomastus_fragilis_lumbrineris_spp_and_venerid_bivalves_in_circalittoral_coarse_sand_or_gravel **Consideration in the assessment** The evidence provided by MarESA is the similar to that presented for MC5212, which is to be expected given the similarities between them, our rationale for consideration within the assessment is therefore the same		

Note: 'Full recovery' is envisaged as a return to the state of the habitat that existed prior to impact. However, this does not necessarily mean that every component species has returned to its prior condition, abundance or extent but that the relevant functional components are present and the habitat is structurally and functionally recognizable as the initial habitat of interest. The assessments are based on key structural or functional or important characteristic species for each biotope (Tyler-Walters *et al* 2023).





Legend

- Offshore Development Area
- Offshore Export Cable Corridor
- DBS East Array Area
- DBS West Array Area
- Inter-Platform Cable Corridor
- Dogger Bank Special Area of Conservation (SAC)

EUNIS Classification

- MB5233: *Nephtys cirrosa and Bothyporeia* spp. in Atlantic infralittoral sand
- MC3212: *Mediomastus fragilis, Lumbrineris* spp. and venerid bilvalves in Atlantic circalittoral coarse sand or gravel
- MC3215: *Branchiostoma lanceolatum*in Atlantic circalittoral coarse sand with shell gravel
- MC3: *Circalittoral coarse sediment*
- MC5212: *Abra prismatica, Bathyporeia elegand* and polychaetes in circalittoral fine sand
- MC5214: *Abra alba and Nucula nitikdosa* in ciracllitoral muddy sand or slightly mixed sediment
- MC5214 & MC1251: *Abra alba and Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment and Piddocks with a sparse associated fauna in Atlantic circalittoral very soft chalk or clay

S2	P02	13/03/2025	Suitable for Information	SM	CC	RF
S2	P01	06/11/2024	Suitable for Information	SM	CC	RF
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Completed environmental stations and EUNIS (EEA, 2022) habitat classifications within the Offshore Development Area within the Dogger Bank SAC

Figure: A-1	Drawing No: PC2340-RHD-OF-ZZ-DR-Z-0910	
Co-ordinate system: WGS 1984 UTM Zone 31N	Page Size: A3	Scale: 1:265,000
Project: Dogger Bank South Offshore Wind Farms	Report: Sandbank Habitat Recovery Technical Note	

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DBS Offshore Wind

Appendix B - Dogger Bank B UXO Crater Survey Results

Dogger Bank B UXO crater survey results, June 2023

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1 Introduction

The Dogger Bank B (DBB) UXO clearance campaign was completed by Boskalis in February-March 2023 under marine licence L-2023-000181. Six confirmed UXO (cUXO) were neutralised using high order clearance methodology due to the degraded nature of the cUXO mine casings. Condition 5.2.21 of the marine licence requires the Project to monitor any craters caused by high order cUXO clearances as follows:

> *Long term monitoring of any craters caused by high order detonation(s) within the Dogger Bank Special Area of Conservation must be undertaken and the results submitted to the MMO for approval within eight weeks of every survey being undertaken.*
>
> *Monitoring is to be undertaken during the post lay survey, which is expected to take place 12 to 18 months after UXO clearance operations.*
>
> *If craters have not recovered at this stage further monitoring and/or remedial action to support recovery of the benthic community must be implemented as approved by MMO in consultation with Natural England and the Joint Nature Conservation Committee.*

Due to survey requirements for Dogger Bank C, there was an opportunity for the Project to carry out a survey of the cUXO clearance craters in June 2023 at five of the six cUXO clearance locations. This Technical Note presents the results of the first post-clearance campaign survey of those five craters.

2 Crater Survey Results

All six cUXO cleared in the 2023 campaign were located within the DBB array area (Figure 1). Post-clearance surveys of the resultant craters were carried out by Boskalis, the UXO clearance contractor, using an ROV mounted Multi-Beam Echo Sounder (MBES) deployed from the vessel *Kamara*. This provided detailed surveys of each 'as left' crater from a position in the water column just above the resultant clearance craters.

The survey on 5 June 2023 was undertaken using the vessel *Mimer* using a hull-mounted MBES to re-survey the UXO crater locations. Unfortunately it was not possible to re-survey DBB_035 at that time, however the Project presents below the results of the five post-clearance surveys achieved in June 2023 in line with marine licence condition 5.2.21.

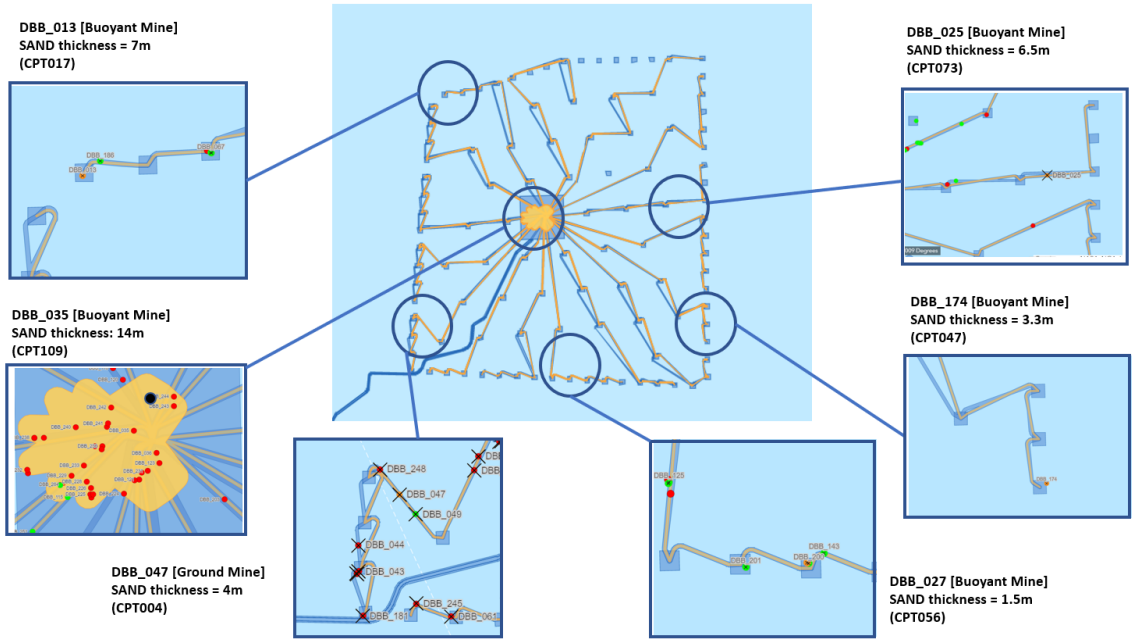
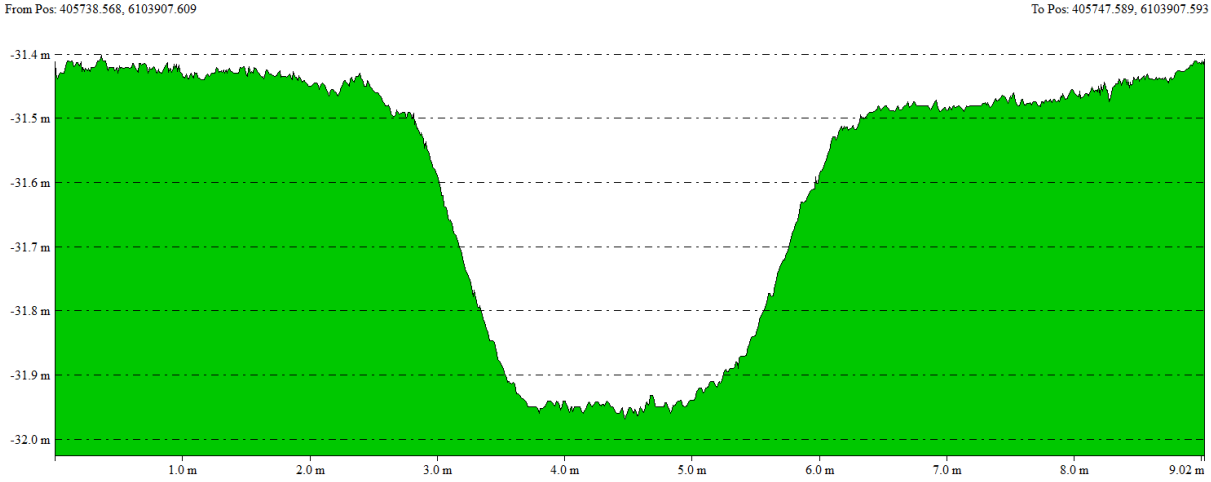


Figure 1. Location of cUXO in Dogger Bank B array area cleared in February and March 2023.

Figure 2 below shows the post-clearance survey results from the *Kamara* for target DBB_013. The site was located over an approximately 7m deep sand layer. The post-clearance 'as left' survey on 20 February 2023 following clearance of the buoyant mine demonstrated that a crater of approximately 0.5m remained after the high order target clearance. The *Mimer* survey on 5 June 2023 showed that the crater had largely infilled within the intervening time period, with a small depression of >0.1m remaining at this location.

DBB_013 - Kamara (as left 22-02-23)



Mimer (monitoring 05-06-23)

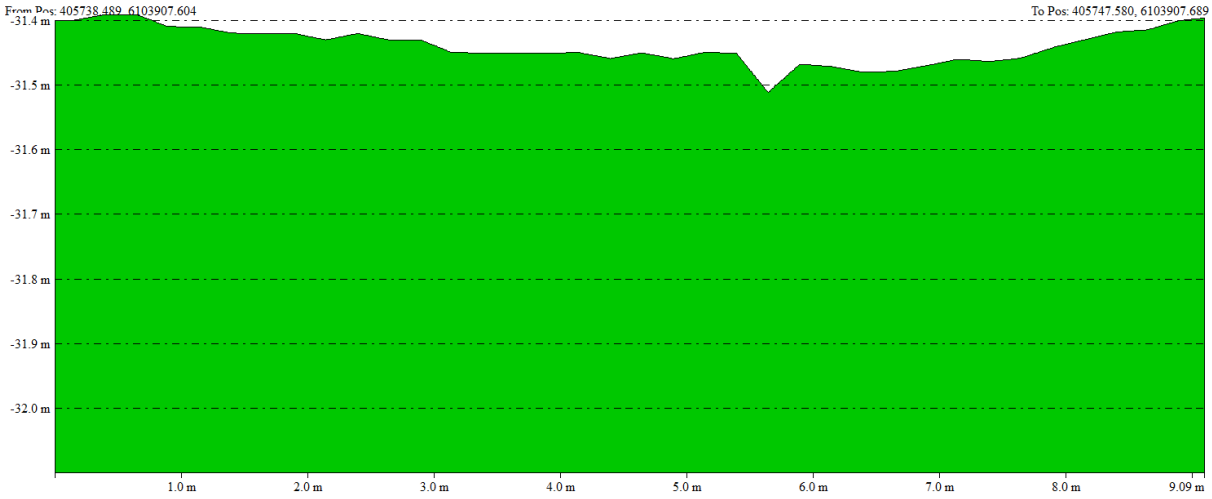
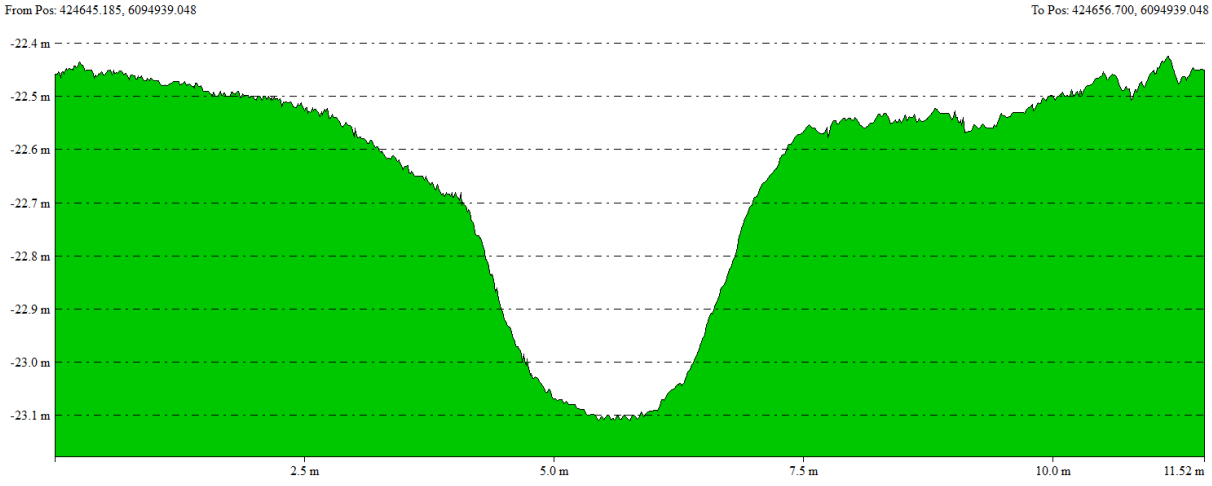


Figure 2. Target DBB_013 MBES surveys 'As left' on 22 February 2023 and Mimer 5 June 2023.

Figure 3 below shows the post-clearance crater survey results from buoyant mine target DBB_025, located in approximately 6.5m depth of sand layer. The 'as-left' survey results collected immediately after the high-order target clearance on 3 March 2023 showed a crater of approximately 0.6m depth. The *Mimer* survey on 5 June 2023 showed that the crater had largely infilled within the intervening time period.

DBB_025 - Kamara (as left 03-03-23)



Mimer (monitoring 05-06-23)

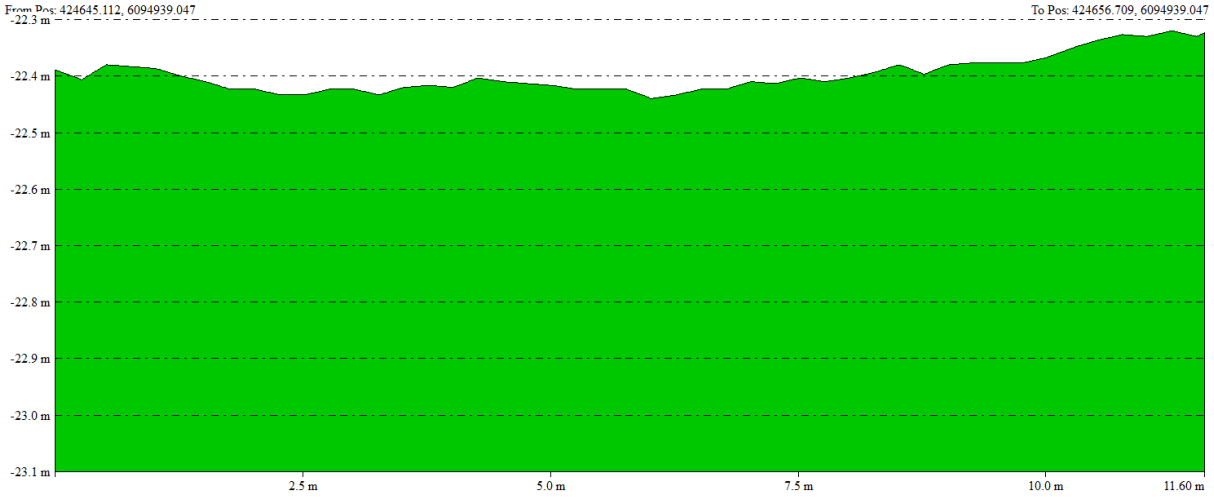
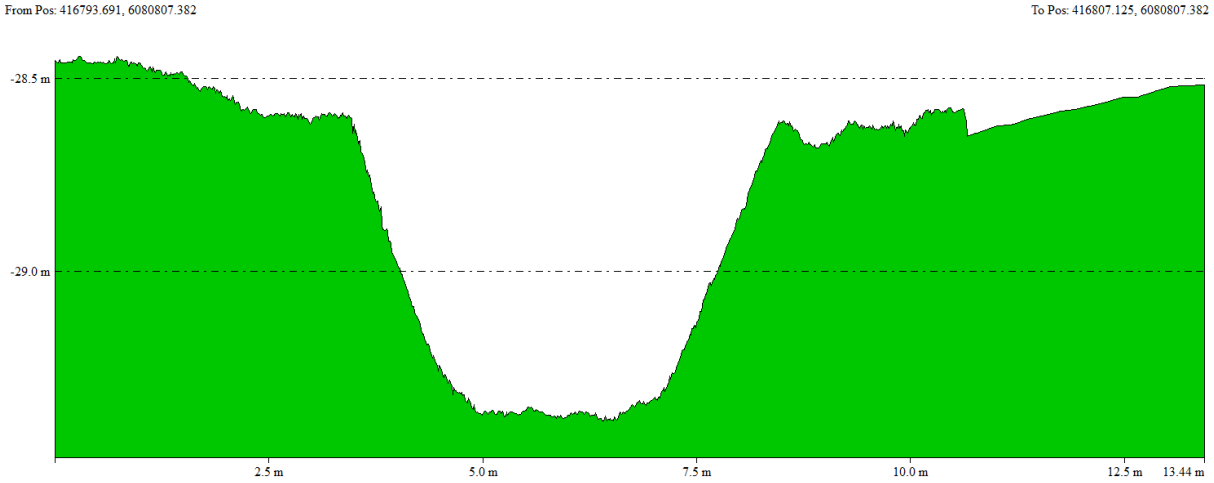


Figure 3. Target DBB_025 MBES surveys 'As left' on 3 March 2023 and Mimer 5 June 2023.

Figure 4 below shows the MBES survey results for UXO buoyant mine clearance target DBB_027, which was cleared using high order methodology on 16 February 2023 in an area of around 1.5m sand depth. The 'as left' survey demonstrated that a crater of approximately 0.8m remained following the UXO clearance. The *Mimer* MBES survey on 5 June 2023 showed that the crater had infilled to half the original depth to approximately 0.4m deep.

DBB_027- Kamara (as left 16-02-23)



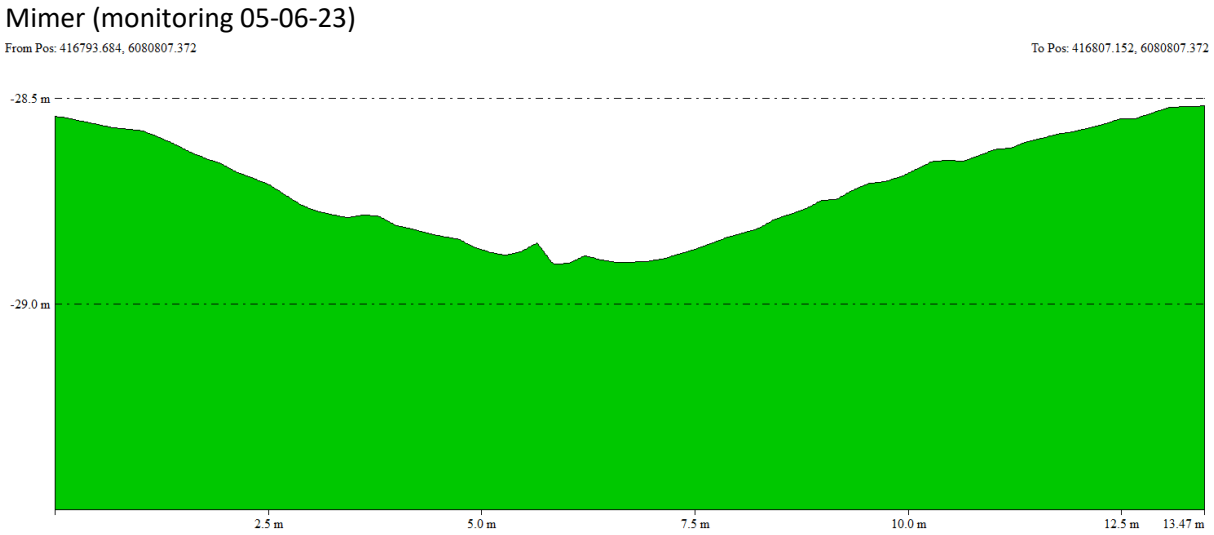
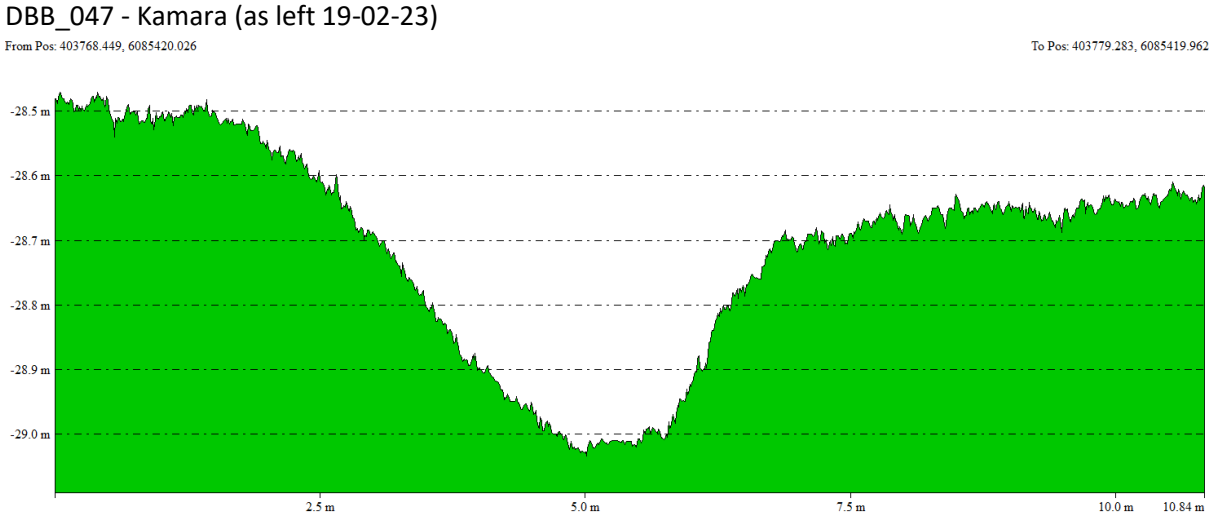


Figure 4. Target DBB_027 MBES surveys 'As left' on 16 February 2023 and Mimer 5 June 2023.

Figure 5 below shows the results of the MBES surveys at target DBB_047, a high order clearance of a ground mine located in a sand depth layer of around 4m on 19 February 2023. The initial 'as left' survey crater was approximately 0.6m deep. The *Mimer* survey on 5 June 2023 showed that the crater had infilled to about half the original depth at around 0.3m at that point in time.



Mimer (monitoring 05-06-23)

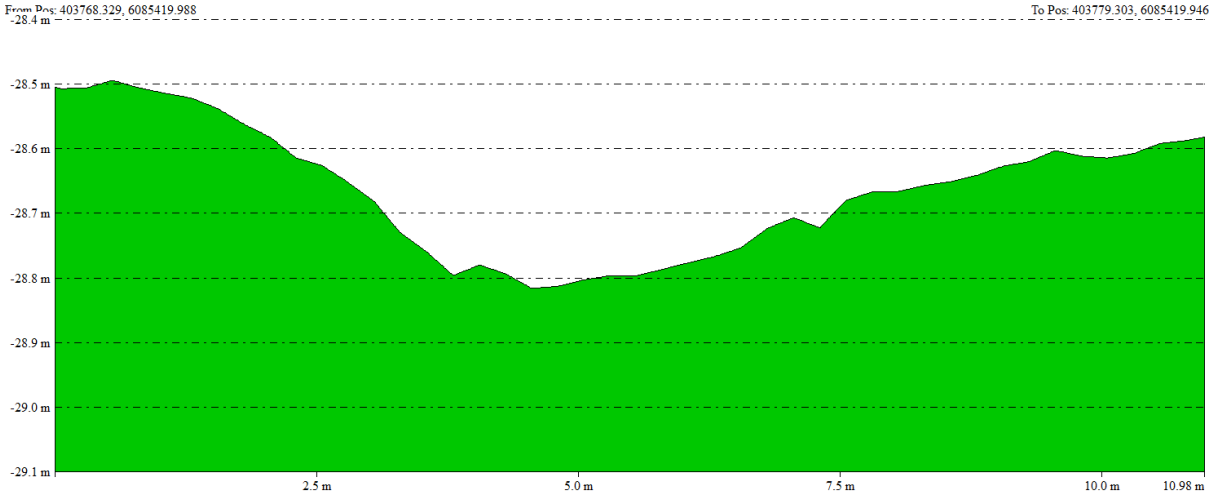
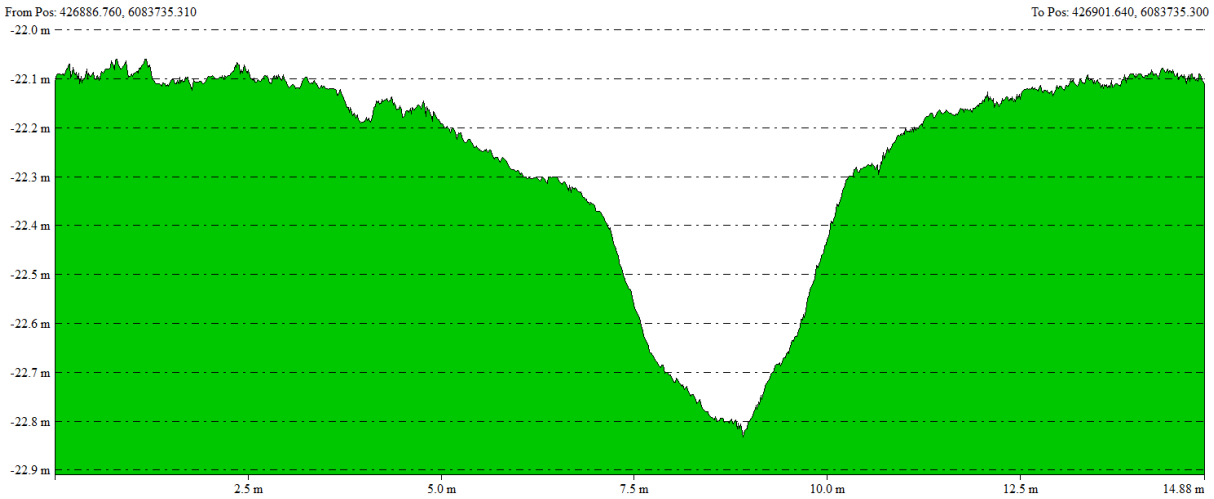


Figure 5. Target DBB_047 MBES surveys 'As left' on 19 February 2023 and Mimer 5 June 2023.

Figure 6 below shows the MBES survey results for UXO target DBB_174, a buoyant mine cleared using high order methodology from a location with 3.3m sand depth. The initial 'as left' survey revealed a crater of approximately 0.7m on 2 March 2023. The subsequent *Mimer* survey on 5 June 2023 indicated that the crater had largely infilled, with a seabed depression of approximately 0.2m remaining at this location.

DBB_174 - Kamara (as left 02-03-23)



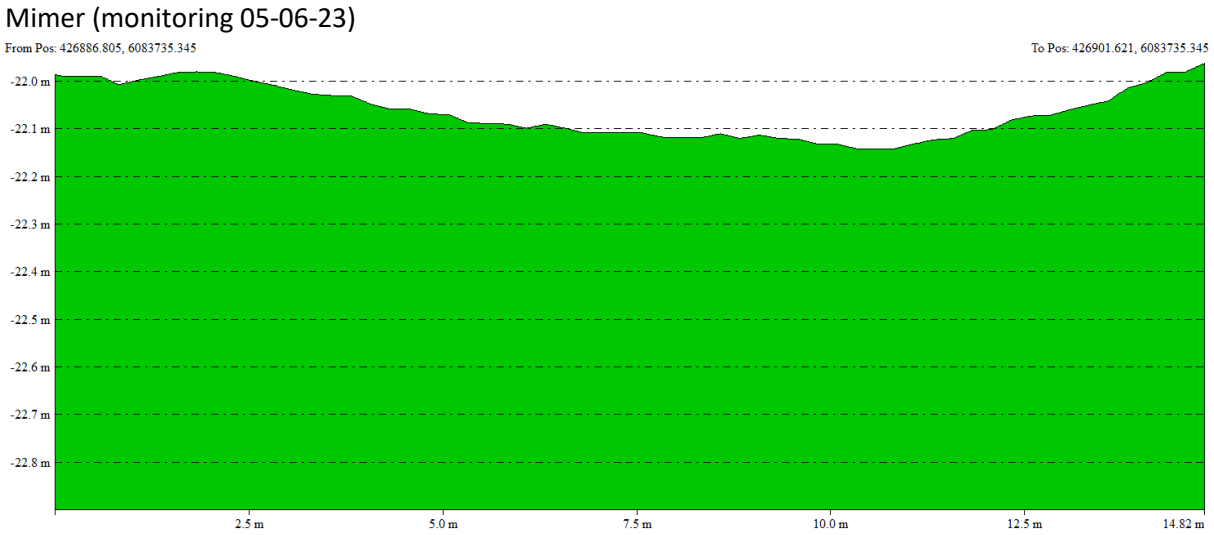


Figure 6. Target DBB_174 MBES surveys 'As left' on 2 March 2023 and Mimer 5 June 2023.

The Project is planning to return to the DBB UXO clearance locations to carry out further UXO clearance crater surveys, which have been tentatively arranged for March 2024. Target DBB_035, which was not surveyed by the *Mimer* in June 2023, will be surveyed at that time.

On the basis of the results presented here at target locations DBB_013, DBB_025 and DBB_174 where 'as left' UXO clearance craters surveyed in June 2023 appear to have already infilled, no further surveys are proposed. The Project asks the MMO to confirm agreement with this strategy. Further surveys are planned for targets DBB_027 and DBB_047 where high order clearance craters had not fully infilled at the time of the *Mimer* survey in June 2023, together with the missing post-clearance survey at DBB_035.

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