Marine Management Organisation

MMO Stage 3 Site Assessment: Swallow Sand MPA (DRAFT)






...ambitious for our seas and coasts

MMO Stage 3 Site Assessment: Swallow Sand MPA (DRAFT)

Contents

Executive Summary

This assessment analyses the impact of anchored nets and lines, bottom towed gears and traps on the designated features subtidal sand and subtidal coarse sediment in Swallow Sand Marine Protected Area (MPA) to determine whether a significant risk of hindering the conservation objectives of the site can be excluded. The assessment sets out the evidence considered and analyses the quality of that evidence. **The assessment finds that for anchored nets and lines, and traps, at the activity levels described, there is not a significant risk that fishing using these gear types will hinder the achievement of the conservation objectives of Swallow Sand MPA. There is however, a significant risk, despite activity levels described, that fishing using bottom towed gears will hinder the achievement of the conservation objectives. As such, the Marine Management Organisation (MMO) concludes that management measures to prohibit the use of bottom towed gears are required.**

1 Introduction

This assessment considers whether fishing activities are compatible with the conservation objectives of Swallow Sand MPA.

This site is designated as a marine conservation zone (MCZ). This assessment uses the best available evidence to review site characteristics and fishing activity and determine if there is a significant risk of fishing activities hindering the conservation objectives of the site. If so, MMO will develop and introduce suitable management measures, such as MMO byelaws. If MMO byelaws are required, then these will be subject to public consultation and will require confirmation from the Secretary of State to come into effect.

2 Site information

2.1 Overview

The following Joint Nature Conservation Committee (JNCC) site information centre was used to provide background on site geography, designated features and general management approach within this assessment:

- JNCC Site Information – Swallow Sand MCZ[1]

Swallow Sand MPA is an offshore site located in the northern North Sea, approximately 100 km off the Northumberland coast. The site is one of the largest MPAs in English waters and covers an area of approximately 4746 km^2. The site is a simple rectangle, measuring approximately 85 km by 56 km and has a depth range of approximately 50 to 150 m **(Figure 1**).

[1] Swallow Sand Site Information Centre jncc.gov.uk/our-work/swallow-sand-mpa/ (Last accessed 21 August 2023)

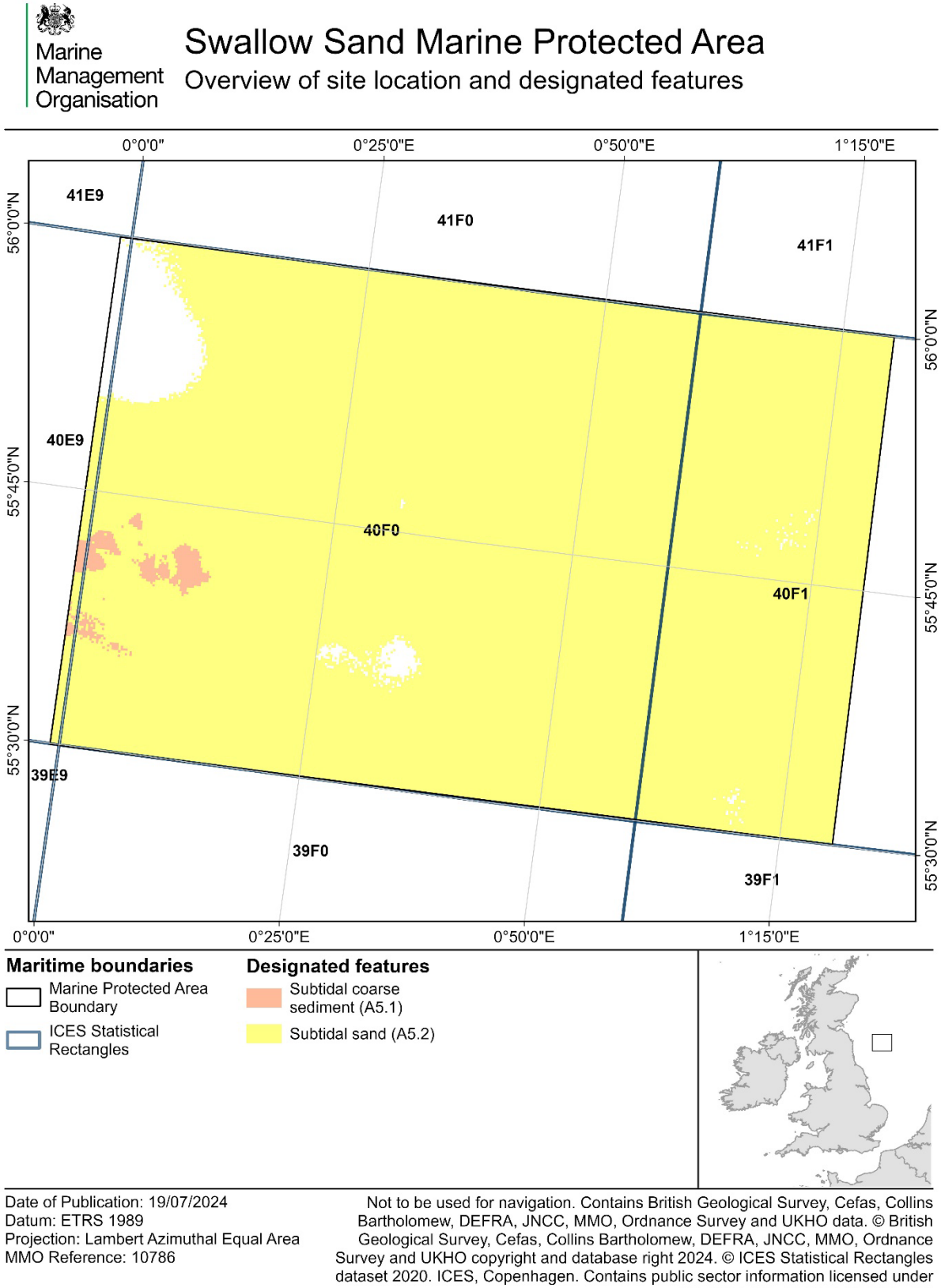

Figure 1: Swallow Sand MPA location overview.

Swallow Sand MPA was designated as an MCZ in 2013. The site is designated to protect the broad-scale habitats 'subtidal coarse sediment', 'subtidal sand', and the 'North Sea glacial tunnel valley' feature, Swallow Hole. The communities within the site are made up predominantly of low energy sediment habitats supporting a range of marine flora and fauna, with associated biological communities typically comprised of polychaetes, molluscs and crustaceans in subtidal sand, and burrowing polychaetes and bivalves, as well as epifaunal echinoderm and anthozoan species in subtidal coarse sediment.

Subtidal sand occurs throughout the site, whereas the majority of the subtidal coarse sediment is located at the western edge of the site, with evidence of a number of smaller patches of coarse sediment through the central and eastern sections.

The general management approaches for the features of Swallow Sand MPA have been set out based on a vulnerability assessment. The designated features and their general management approach are set out in **Table 1**.

Table 1: Designated features and general management approach.

Designated feature	General management approach
Subtidal coarse sediment	Maintain in favourable condition
Subtidal sand	
North Sea glacial tunnel valley (Swallow Hole)	Maintain in favourable condition

There is no feature condition assessment available for this site; in its absence a vulnerability assessment, which includes sensitivity and exposure information for features and activities in a site, is used as a proxy for condition.

2.2 Scope of this assessment

The scope of this assessment covers fishing activities alone, and relevant activities in combination with fishing. This assessment covers the whole of Swallow Sand MPA (**Figure 1**).

3 Part A - Identified pressures on the MPA

Part A of this assessment was carried out in a manner that is consistent with the 'capable of affecting (other than insignificantly)' test required by section 126 of the Marine and Coastal Access Act 2009[2].

Part A assesses the interactions between pressures from fishing gears on the designated features of this site, screening for interactions that require further consideration. Assessment of interactions not screened out in Part A will form Part B of the assessment. For each activity assessed in Part A, there are two possible outcomes for each identified pressure-feature interaction:

1. The pressure-feature interactions **are not** included for assessment in Part B and screened out:
    a. if the feature is not exposed to the pressure, and is not likely to be in the future;
    b. if the pressure is not capable of affecting the feature, other than insignificantly; or
    c. if MMO has information that the activity or pressure is not occurring in the site and/or does not need to be considered further.

2. The pressure-feature interactions **are** included for assessment in Part B:
    a. if the feature is exposed to the pressure, or is likely to be in the future;
    b. if the pressure is capable of affecting the feature, other than insignificantly;
    c. if it is not possible to determine whether the pressure is capable of affecting the feature, other than insignificantly; or
    d. if MMO has information that the activity or pressure is occurring in the site and/or does need to be considered further.

Consideration of a pressure on a protected feature in an MPA includes consideration of the pressure's exposure to, or effect on, any ecological or geomorphological process on which the conservation of the protected feature is wholly or in part dependent.

3.1 Activities taking place

Table 2 lists all commercial fishing gears included for assessment. All other gears are excluded from further assessment as they do not take place and are not likely to take place in the future, as there are no vessel monitoring system (VMS) records present within the site linked to these gear codes, nor do they appear in landings data for International Council for the Exploration of the Sea (ICES) statistical rectangles that overlap the site.

[2] For more information, Marine and Coastal Access Act 2009 : www.legislation.gov.uk/ukpga/2009/23/section/126

To determine fishing activity occurring within the site, the following evidence sources were used:

- VMS data;
- fisheries landings data (logbooks and sales records);
- ICES rectangle level fishing effort data in days (reference: MMO1264); and
- swept area ratio data.

For more information about the above evidence sources, please see the MPA Site Assessment Methodology document[3], which describes each type of fishing activity evidence and summarises the strengths and limitations of each source.

[3] MPA Site Assessment Methodology document: www.gov.uk/government/publications/stage-3-site-assessments (Last accessed 13 August 2024).

Table 2: Fishing activities covered by this assessment present in VMS records (2016 to 2021) and landings data (2016 to 2020) for Swallow Sand MPA.

Gear type	Gear name	Gear code	Justification
Anchored nets and lines	Longline (unspecified)	LL	Present in under 12 m landings data for ICES statistical rectangles that overlap the site.
	Set gillnet (anchored)	GNS	Present in VMS records for the site.
Bottom towed gear	Beam trawl	TBB	
	Bottom otter trawl	OTB	Present in VMS records and under 12 m landings data for ICES statistical rectangles that overlap the site.
	Nephrops trawl	TBN	
	Otter trawls (unspecified)	OT	Present in under 12 m landings data for ICES statistical rectangles that overlap the site.
	Scottish/fly seine	SSC	Present in VMS records for the site.
	Towed dredge	DRB	Present in under 12 m landings data for ICES statistical rectangles that overlap the site.
	Twin bottom otter trawl	OTT	Present in VMS records and under 12 m landings data for ICES statistical rectangles that overlap the site.
Midwater gear	Drift gillnet	GND	Present in under 12 m landings data for ICES statistical rectangles that overlap the site.
	Hook and line (unspecified)	LX	
	Midwater otter trawl	OTM	Present in VMS records for the site.
	Purse seine (ring net)	PS	
Traps	Pot/creel	FPO	Present in under 12 m landings data for ICES statistical rectangles that overlap the site.
Miscellaneous	Not known	NK	Present in VMS records for the site.

3.2 Pressures, features and activities screened out

This section identifies activities or pressures that are **occurring but do not need to be considered** for Swallow Sand MPA.

The gear types and pressures screened out on this basis are listed below with justification:

- **Midwater gears:** although the use of midwater gears does occur within Swallow Sand MPA, there is no feasible pathway for gears of this type to interact with benthic designated features under normal operation. These gear types are not designed to operate on or near the seabed and are deployed entirely within the water column. Therefore, the use of midwater gear within Swallow Sand MPA is not considered to be capable of affecting the designated features other than insignificantly and is not considered further within this assessment.
- **Geological or geomorphological designated features:** Swallow Hole is out of scope for this assessment as fishing activities are considered incapable of significantly impacting these features.
- **Miscellaneous gear:** 'other gear' has been declared as having been used to land fish from this ICES statistical rectangle. The gear code used to report these landings does not provide any further information relating to the fishing method used. It is therefore not possible to assess the likelihood of this fishing method interacting with the seabed and it is not considered further within this assessment.

3.3 Pressures to be taken forward to Part B

The Stage 3 Fishing Gear MPA Impacts Evidence documents detail all pressures created by fishing activity on features of interest. The documents justify which pressures should be taken forward for consideration for each feature. This is documented in Table A1.2 in the anchored nets and lines, bottom towed gear and traps Impacts Evidence documents[4]:

- Stage 3 Fishing Gear MPA Impacts Evidence Anchored Nets and Lines[5]

[4] Stage 3 MPA Impacts Evidence: www.gov.uk/government/publications/marine-protected-areas-stage-3-impacts-evidence (last accessed 15 June 2023)
[5] Stage 3 Fishing Gear MPA Impacts Evidence Anchored Nets and Lines www.gov.uk/government/publications/marine-protected-areas-stage-3-impacts-evidence (Last accessed 13 August 2024)

- Stage 3 Fishing Gear MPA Impacts Evidence Bottom Towed Gear[6]; and
- Stage 3 Fishing Gear MPA Impacts Evidence Traps[7].

To determine whether a pressure should be taken forward for this particular site, **Table 3** uses the information from the Impacts Evidence documents, alongside site level information, including sensitivity assessments, risk profiling of pressures from conservation advice packages, and JNCC advice to assess the sensitivities of pressures on the designated features of the site.

Table 3 details the pressures for each gear type - anchored nets and lines (A), bottom towed gear (B) and traps (T), to be assessed in Part B, taking into account the pressures screened out in **sections 3.1** and **3.2.**

Key	
	Dark blue highlighting indicates that the feature is sensitive to this pressure from the gear type in this site, and that the interaction should be taken forward for consideration.
	Light blue highlighting indicates that feature is sensitive to the pressure in general, but the gear type is unlikely to exert this pressure to an extent where impacts are of concern in the site.
	Grey highlighting indicates that there is insufficient evidence to make sensitivity conclusions, or that a sensitivity assessment has not been made for this feature to this pressure from the gear type.
	If there is no highlighting within a cell, this indicates that the pressure from the gear type is not relevant to the feature, or that the feature is not sensitive to the pressure.

[6] Stage 3 Fishing Gear MPA Impacts Evidence Bottom Towed Gears www.gov.uk/government/publications/marine-protected-areas-stage-3-impacts-evidence (Last accessed 13 August 2024)

[7] Stage 3 Fishing Gear MPA Impacts Evidence Traps www.gov.uk/government/publications/marine-protected-areas-stage-3-impacts-evidence (Last accessed 13 August 2024)

Table 3: Summary of pressures on designated features of Swallow Sand MPA to be taken forward to Part B.

Potential pressures	Designated features					
	Subtidal coarse sediment			Subtidal sand		
	A	B	T	A	B	T
Abrasion or disturbance of the substrate on the surface of the seabed						
Changes in suspended solids (water clarity)						
Deoxygenation						
Hydrocarbon and polycyclic aromatic hydrocarbon (PAH) contamination						
Introduction of light						
Introduction of microbial pathogens						
Introduction or spread of invasive non-indigenous species						
Litter						
Organic enrichment						
Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion						
Physical change (to another seabed type)						
Physical change (to another sediment type)						
Removal of non-target species						
Removal of target species						
Smothering and siltation rate changes (light)						
Synthetic compound contamination						
Transition elements and organo-metal contamination						

4 Part B - Fishing activity assessment

Part B of this assessment was carried out in a manner that is consistent with the 'significant risk of hindering the achievement of the conservation objectives' test required by section 126 of the Marine and Coastal Access Act 2009[2].

Table 3 shows the fishing activities and pressures identified in Part A which have been included for assessment in Part B. The most relevant attributes of the designated features that could be compromised by fishing pressures were identified using the Swallow Sand MPA conservation advice package[1] and are shown in **Table 4.**

Table 4: Relevant favourable condition targets for identified pressures on both designated features of the site.

Attribute	Target	Relevant pressures
Extent and distribution: sediment composition and biological assemblages.	Maintain the sediment composition and the distribution of biological assemblages within the site.	• Abrasion or disturbance of the substrate on the surface of the seabed. • Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion. • Removal of non-target species. • Removal of target species. • Changes in suspended solids (water clarity). • Smothering and siltation rate changes (light).
Structure and function: key and influential species.	Maintain the presence and abundance of these species within the site.	
Structure and function: characteristic communities.	Maintain the presence and abundance of these communities within the site.	

4.1 Fisheries access and existing management

As Swallow Sand MPA lies beyond 6 nautical miles (nm), non-UK vessels can operate within the site as well as UK vessels, provided that they have a licence issued by the UK to do so. Nationalities that fished within the MPA from 2016 to 2020 include the UK, Germany, Denmark, Spain, France, Lithuania, the Netherlands, Norway and Sweden. VMS records indicate that UK and Danish vessels are most prevalent.

More information on non-UK vessel access to UK waters can be found on MMO's Single Issuing Authority page[8].

There are a number of technical measures in effect within the Swallow Sand MPA for stock management and conservation. The area of the site that falls within ICES rectangles 39E9 and 40E9 in particular is subject to the Farne Deeps Fishing Restrictions, which form part of the schedule to a commercial fishing vessel licence[9]. Subject to a broad range of exemptions, including for vessels deploying trawls with certain mesh sizes and gear specifications, vessels deploying demersal trawls and seines (with the exception of beam trawls) are prohibited from fishing in the Farne Deeps. The section of the site that overlaps these ICES rectangles is a small area along the westernmost boundary of the site measuring approximately 62 km^2 (**Figure 1**) and therefore the Farne Deeps Fishing Restrictions do not apply throughout the vast majority of the site.

These measures are not designed to achieve the conservation objectives of the site (though they may contribute to the achievement of favourable condition) and the impacts from ongoing fishing activities still need to be assessed and managed where appropriate.

4.2 Fishing activity summary

Table A1.1 to **Table A1.7** in **Annex 1** display a detailed breakdown of fishing activity within Swallow Sand MPA. When discussing weights from landings in this section, figures used are a total of weights from UK and EU member states. Unless reference is being made to VMS records, in which case the data reporting period is 2016 to 2021, the period under consideration for all other fishing activity metrics is 2016 to 2020.

In general, fishing activity within the site is limited. The most prevalent gears operated within the site are bottom otter trawls and otter twin trawls. There were approximately 91 bottom otter trawl VMS records and 37 otter twin trawl VMS records on average per year. UK vessels over 12 m in length using bottom otter trawls landed approximately 12.55 tonnes (t) per year, and non-UK vessels over 12 m in length using the same gear landed approximately 442 t per year. There was also an average of 5.8 t of landings reported by vessels using otter twin trawls within Swallow Sand MPA per year. The relatively high average non-UK over 12 m landings from bottom otter trawling is driven primarily by large amounts of sand eel landings from ICES rectangle 40F1 in 2017 and 2018. Despite relatively low annual

[8] The UK Single Issuing Authority: www.gov.uk/guidance/united-kingdom-single-issuing-authority-uksia (Last accessed 11 September 2023).
[9] Category A Commercial Fishing Vessel Licence Schedule: assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1133969/Cat_A_Licence_Schedule_11_V3_04Feb2020.pdf

VMS record counts reported for this gear type by non-UK vessels, the vessels that report these landings are often of a length exceeding 40 metres that are capable of taking a large amount of catch per fishing trip.

Swept area ratio (SAR) analysis indicates that demersal trawl activity is limited throughout the site. Mean surface SAR values for C-squares intersecting Swallow Sand MPA range between 0.007 and 0.05 and mean subsurface values between 0 and 0.01 for vessels deploying demersal trawls. A SAR value of 1 for a given year means that each area C-square experiences a pass of fishing gear on average once a year.

The majority of bottom towed gear activity within Swallow Sand MPA occurs in the northwest corner of the site, over the Swallow Hole geological feature, with very limited additional activity throughout the site. As the site is located over 100 km from shore, fishing activity from vessels under 12 m in length is extremely limited, with less than one tonne of landings attributed to the site in total.

The available data indicate there are very low levels of other activities taking place within the site, such as dredging, *Nephrops* trawling, demersal seining, longlining, potting and gill netting.

4.3 Pressures by gear type

The Stage 3 Fishing Gear MPA Impacts Evidence documents for anchored nets and lines[5], bottom towed gear[6] and traps[7] collate and analyse the best available evidence on the impacts of different fishing gears on MPA features. This section summarises the analyses and conclusions of those documents, and considers these alongside site level information, including the nature and condition of the habitats and species present, the general management approaches for designated features, intensity of fishing activity taking place and exposure to natural disturbance.

As subtidal coarse sediment and subtidal sand designated features have similar sensitivities to the pressures identified for different gear types, these features have been considered together. Where there are differences between the features or the potential impacts of different gears within each grouping, this has been highlighted.

In the context of MPA assessment, the pressures removal of target and non-target species refer to any damage, loss, or removal of species defined as a designated feature or integral to the integrity of a designated feature (for example key structural or influential species). This may occur through intentional or unintentional catch associated with the act of commercial fishing. For the purposes of benthic feature assessments, the physical effects of fishing gears on seabed communities are best addressed through the assessment of abrasion and penetration pressures. As there are no designated species features associated with Swallow Sand MPA, and the detail of key structural and influential species is yet to be fully defined, we conclude that impacts from target and non-target removal pressures can be scoped out from

further assessment of this site. These pressures may require consideration as a result of any future evidence review, in conjunction with updated conservation advice from JNCC and Natural England.

Information about the biotopes in the site was provided by the Biotope Presence-Absence spreadsheet of JNCC Report No.647 which listed European Nature Information System (EUNIS) biotopes that were present, likely to be present, or absent from each UK offshore bioregion based on survey data, environmental information, species records, literature and expert judgement (Tillin et al., 2020). Biotopes were screened out if they were not located in the same bioregion as Swallow Sand MPA (Northern North Sea bioregion 1a, outside of the Fladen Ground), and if they were not found at the depth range for the site (50 to 150 m). Information about the depth range of each biotope was listed in the Biotope Database of JNCC Report No. 647 (Tillin et al., 2020) and sensitivity information was extracted from Marlin[10] and biotope presence from JNCC's Marine habitat classification for Britain and Ireland[11].

Additional information on biotopes was obtained from a community analysis of offshore MCZ grab and video data, which included Swallow Sand (Allen, Axelsson and Dewey, 2016). Some biotopes assigned to the site following this analysis indicated mismatches with the designated broad-scale habitat features of the site. Although commonly associated with subtidal mud, the following biotopes have been found within the extent of subtidal sand feature of Swallow Sand MPA[12] (Curtis *et al.*, 2020):

- Seapens and burrowing megafauna in circalittoral fine mud.
- *Paramphinome jeffreysii, Thyasira spp.* and *Amphiura filiformis* in offshore circalittoral sandy mud

[10] Sensitivity information from Marlin. www.marlin.ac.uk/ (Last accessed 23 June 2023)

[11] Biotope presence, JNCC's Marine Habitat Classification for Britain and Ireland. hub.jncc.gov.uk/assets/f9a6a2be-e6be-4f7f-8605-28c1b4062658 (Last accessed 12 February 2024)

[12] JNCC/Cefas Partnership Report Series, Report No. 31 Swallow Sand MCZ Monitoring Report 2016. data.jncc.gov.uk/data/3fbf6d68-bc1b-40d3-a76b-de47ba1ed440/JNCC-CEFAS-31-FINAL-WEB.pdf (Last accessed 13 February 2024)

As it has been demonstrated that these biotopes are present within the extent of the designated feature, the sensitivity of these biotopes has been considered within this assessment.

Biotopes with at least medium sensitivity to pressures exerted by fishing gears are listed in **Table 5**.

As outlined in **Table 5**, out of 14 biotopes present or potentially present in Swallow Sand MPA, one subtidal coarse sediment biotope has medium sensitivity to penetration. Three subtidal sand biotopes have medium sensitivity to abrasion and penetration, and one, ‘seapens and burrowing megafuana in circalittoral fine mud’ has medium sensitivity to abrasion, and high sensitivity to penetration.

Table 5: Sediment biotopes with at least medium sensitivity to relevant pressures (* = possible presence).

Broad-scale habitat	Biotope	Sensitivity
Subtidal coarse sediment	*Branchiostoma lanceolatum* in circalittoral coarse sand with shell gravel (Tillin and Watson, 2023)*	Medium sensitivity to: • Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion.
Subtidal sand	Maldanid polychaetes and *Eudorellopsis deformis* in offshore circalittoral sand or muddy sand (Ashley, 2016)*	Medium sensitivity to: • Abrasion or disturbance of the substrate on the surface of the seabed; and • Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion.
	Owenia fusiformis and *Amphiura filiformis* in offshore circalittoral sand or muddy sand (De-Bastos, 2023)*	
	Paramphinome jeffreysii, Thyasira spp. and *Amphiura filiformis* in offshore circalittoral sandy mud (De-Bastos, 2016)	
	Seapens and burrowing megafauna in circalittoral fine mud (Hill *et al.*, 2023)	Medium sensitivity to: • Abrasion or disturbance of the substrate on the surface of the seabed; and High sensitivity to; • Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion

4.3.1 Anchored nets and lines

The subtidal coarse sediment and subtidal sand features of Swallow Sand MPA have been considered in relation to the following pressures from anchored nets and lines.

- abrasion or disturbance of the substrate on the surface of the seabed;
- removal of non-target species; and
- removal of target species.

As noted previously, impacts from removal of target and non-target species pressures are not being considered in detail in this assessment, as they are assessed more completely within the abrasion pressure.

Impacts on sediment features relating to abrasion or disturbance of the substrate on the surface of the seabed occur primarily during setting and retrieval of nets and the associated ground lines and anchors, as well as during movement over the seabed when subject to currents, tides or storm activity.

Section 9.3 of the anchored nets and lines Impacts Evidence document[5] sets out that abrasion pressures resulting from the use of anchored nets and lines are unlikely to have a significant impact on subtidal sediment designated features as these habitats are considered resilient to all but intense fishing activity using anchored nets and lines on species rich sediment habitats or those with long-lived bivalves. At the broad-scale habitat level, abrasion pressures are likely to be more impactful to subtidal coarse sediment habitats than subtidal sand habitats as coarse sediments often contain populations of sessile epifauna.

Though four biotopes present within the site have been identified as sensitive to abrasion pressures, these biotopes are capable of resisting abrasive impacts from anchored net and line activity as the characteristic species present are able to burrow or retract into the sediment (for example, the sea pen *Pennatula phosphorea)*, or are capable of resisting or recovering from injury caused by surface abrasion.

Section 4.2 describes fishing activity within Swallow Sand MPA. Fishing activity with anchored nets and lines appears to be minimal within the site. VMS records show that the activity that does occur from vessels over 12 metres in length occurs in the south east of the site, exclusively over the subtidal sand feature. UK under 12 m fishing effort (days) data from ICES rectangle 40E9 apportioned to the site indicates that there may be a very low amount of UK under 12 m effort along the westernmost edge of the site (approximately 0.004 days per year on average). This area contains both subtidal sand and subtidal coarse sediment, therefore it is possible that this activity may occur over both designated features. However, this data assumes that activity is distributed evenly across the ICES rectangle, and it is more likely that

activity from vessels under 12 m in length occurs in the area of the ICES rectangle that is closer to shore, outside of the site boundary.

The available data indicates that there is little interaction between anchored nets and lines activity and the designated features, so the risk of abrasion and disturbance is limited. Fishing activity at this level is unlikely to significantly impact the condition of the sediment features or general management approach of 'maintain in favourable condition'.

Therefore, **MMO concludes that the at the levels described, anchored nets and lines does not pose a significant risk of hindering the achievement of the conservation objectives of Swallow Sand MPA.**

4.3.2 Bottom towed gear

The subtidal coarse sediment and subtidal sand features of Swallow Sand MPA have been considered in relation to the following pressures from bottom towed gear:

- abrasion or disturbance of the substrate on the surface of the seabed[*];
- penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion*;
- changes in suspended solids (water clarity)[Δ];
- smothering and siltation rate changes (light) [Δ];
- removal of non-target species; and
- removal of target species.

Pressures marked with matching superscript symbols (* and Δ) have been consolidated due to the similar nature of their impacts on the sediment features.

As noted previously, impacts from removal of target and non-target species pressures are not being considered in detail in this assessment, as they are assessed more completely within the abrasion pressure.

Section 4.2 describes fishing activity within Swallow Sand MPA. VMS, SAR and landings records (presented in **Annex 1**) indicate that demersal seining and dredging activity in the site is minimal, if occurring at all. Therefore, the assessment of bottom towed gear in this section has been made primarily on the basis of the impacts of demersal trawling.

Bottom otter trawls were the main gear type used by vessels over 12 m in the site. Demersal trawl VMS records are largely concentrated in the northwest of the site, and do not overlap the designated features of the site, and therefore the majority of the trawling occurring within the site does not directly impact the subtidal sand and subtidal coarse sediment features. The remaining bottom towed gear VMS records are distributed sporadically throughout the rest of the site and SAR for C-squares located over the designated features of the site are generally low, meaning the designated features of the site are unlikely to experience frequent exposure to direct

abrasion and penetration pressures, or indirect pressures such as smothering or changes in suspended solids. This allows more time for the designated features to recover between trawl passes, however the first passage of a demersal trawl is considered the most impactful.

‘Changes in suspended solids (water clarity)’ and ‘Smothering and siltation rate changes (light)’

Bottom towed fishing gears are capable of causing pressures relating to changes in suspended solids and smothering on sediment habitats. Contact between the gear and the sediment causes mixing between seawater and the top layer of sediment and entrainment around the gear. Even irregular contact with bottom towed gear is enough to keep some sediment habitats in a transient state, and regular contact may prevent sediment habitats from ever reaching a stable state.

As per section 8.4 of the bottom towed gear Impacts Evidence document[6], these pressures can impact biological communities in sediment habitats through the disruption of biogeochemical processes, increasing oxygen demand, clogging the organs of filter feeding species and infilling the burrows of infaunal species.

None of the biotopes that are present or possibly present in the site had medium sensitivity or higher to change in suspended solids or smothering and siltation pressures. This is primarily driven by a high resilience of the characteristic species to increased suspended sediment loads. Based on the low sensitivity of the species present in the site and limited fishing activity within the site generating these pressures, it is unlikely that these pressures are a concern in relation to the conservation objectives of the site.

‘Abrasion or disturbance of the substrate on the surface of the seabed’ and ‘Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion’.

Bottom towed gear disturbs the seabed by dragging fishing gear over the seabed. This disturbance can modify benthic habitats and lead to direct and indirect mortality for infaunal and epifaunal species. As per section 8.4 of the bottom towed gear Impacts Evidence document[6], abrasion and penetration pressures resulting from bottom towed gear use can have both physical and biological impacts. Physical impacts are unlikely to significantly affect the large-scale topography of sediment features, and the small-scale impacts to topographic features, such as ribbons and waves made by fishing gear in the sediment, are unlikely to have a significant effect on the habitat. Biological impacts are of greater concern, such as damage and direct and indirect mortality of flora and fauna, particularly of benthic invertebrates, via crushing and collision with the gear, which causes reductions in species richness, and diversity. These changes can alter the community structure of sediment habitats by removing sensitive species and allowing more resilient opportunistic species which are less susceptible to damage to remain.

As detailed in **Table 5,** the biotope 'seapens and burrowing megafauna in circalittoral fine mud' is highly sensitive to penetration and is distributed widely throughout the site (Allen, Axelsson and Dewey, 2016). Although usually found in subtidal mud, the subtidal sand within Swallow Sand MPA contains a relatively high mud fraction where these biotopes are found (Lark, 2014). The presence of this sensitive biotope increases the time required for recovery following interactions with bottom towed gear. In addition, objects causing abrasion are likely to penetrate deeper into softer sediment and cause increased mortality of infaunal or burrowing communities, which are often characteristic of the subtidal sand present within the site. Finally, due to the low tidal current velocity within the site (Curtis *et al.*, 2020), the sediments present are low energy and relatively stable, meaning the species and habitats are not regularly exposed to natural disturbance and are less resilient to anthropogenic impacts as a result.

In conclusion, the high mud fraction of the designated subtidal sand feature and subsequent presence of the highly sensitive seapen biotope, and the low energy and relative stability of the site, means that it is difficult to exclude potential negative impacts from bottom towed fishing activity in Swallow Sand MPA, even though it is at very low levels in the years analysed. In addition, if bottom towed fishing patterns were to increase over time, for example through displacement as a result of fisheries management measures or offshore developments, changes in target species distribution, or the discovery of novel stocks, there is an increased likelihood of the conservation objectives for the site not being met due to the sensitivity of the site to this type of fishing gear.

With regards to the discussion above, despite low activity levels, the high mud fraction, presence of highly sensitive biotopes, low natural disturbance and the evidence available for the impacts of bottom towed gear, **MMO concludes that the use of bottom towed gear poses a significant risk of hindering the achievement of the conservation objectives of Swallow Sand MPA.**

4.3.3 Traps

The subtidal coarse sediment and subtidal sand features of Swallow Sand MPA have been considered in relation to the following pressures from traps;

- abrasion or disturbance of the substrate on the surface of the seabed;
- removal of non-target species; and
- removal of target species.

As noted previously, impacts from removal of target and non-target species pressures are not being considered in detail in this assessment (aside from within the bottom towed gear section in relation to two subtidal sand biotopes), as they are assessed more completely within the abrasion pressure.

As per section 9.4 of the traps Impacts Evidence document[7], abrasive impacts from traps are caused primarily through the interaction between the seabed and the gear itself including associated lines and anchors. This is more likely to occur if the gear moves across the seabed during hauling of gear or when the gear is subject to strong tides, currents, or storm activity.

Subtidal coarse sediment and subtidal sand features are not considered sensitive to impacts from traps except at very high intensities, though coarse sediment habitats like those present in Swallow Sand MPA are slower to recover than clean sand habitats.

As outlined in **Table 5**, out of nine biotopes present or potentially present in Swallow Sands MPA, two in subtidal coarse sediment and seven in subtidal sand, two have unknown sensitives to pressures, the remaining have medium sensitivities to abrasion, and removal of non-target and target species pressures.

Though four biotopes present within the site have been identified as sensitive to abrasion pressures, these biotopes are capable of resisting abrasive impacts from anchored net and line activity as the characteristic species present are able to burrow or retract into the sediment (for example, the sea pen *Pennatula phosphorea)*, or are capable of resisting or recovering from injury caused by surface abrasion.

Section 4.2 describes fishing activity within Swallow Sand MPA. The only record of any fishing activity using traps comes from UK vessels under 12 metres in length. There were no VMS records reported within the site using traps between 2016 and 2021. Landings data shows an average landed weight of <0.01 t per year from UK under 12 m vessels using traps. In addition, 0.01 days of fishing effort from UK under 12 m vessels per year. These data are apportioned to the site by calculating the percentage of overlapping ICES rectangles taken up by the site. In this case, the fishing effort data is apportioned entirely from ICES rectangle 40E9. However, this data assumes that activity is distributed evenly across the ICES rectangle, and it is more likely that activity from vessels under 12 m in length occurs in the area of the ICES rectangle that is closer to shore, outside of the site boundary.

The available data indicates that there is little interaction between traps and the designated features, so the risk of abrasion and disturbance is limited. Fishing activity at this level is unlikely to significantly impact the condition of the sediment features or general management approach of ‘maintain in favourable condition’.

With regards to the discussion above, the assessed activity levels and the evidence available for the impact of traps, **MMO concludes that at the levels described, use of traps does not pose a significant risk of hindering the achievement of the conservation objectives of Swallow Sand MPA.**

4.4 Part B conclusion

The assessment of anchored nets and lines, and traps on the subtidal sand and subtidal coarse sediment features of Swallow Sand MPA has concluded that these fishing activities will not result in a significant risk of hindering the achievement of the conservation objectives of the MPA. As such MMO concludes that management measures to restrict fishing activities using anchored nets and lines, and traps are not required in Swallow Sand MPA.

The assessment of bottom towed gears on the subtidal sand and subtidal coarse sediment features of Swallow Sand MPA has revealed that these fishing activities may result in a significant risk of hindering the achievement of the conservation objectives of the MPA. As such MMO concludes that management measures are required to restrict bottom towed fishing gears from Swallow Sand MPA.

Section 6 contains further details of these measures.

5 Part C - In-combination assessment

This section assesses the impacts of fishing activities in-combination with relevant activities taking place. This includes the following:

- fishing interactions assessed in Part B but which were not considered, alone, to have an adverse effect on the site integrity; and
- other activities: such as marine development infrastructure plans and projects that occur in the MPA.

ArcGIS software has been used to check relevant activities that occur within, or adjacent to, the assessed site where there could be a pathway for impact. To determine relevant activities to be included in this part of the assessment, a distance of 5 km was selected as suitable to capture any potential source receptor pathways that could impact the benthic features of the site in-combination with effects of the fishing activities assessed. A 5 km buffer was therefore applied to the site boundary to identify relevant activities. This assessment considers the in-combination impacts of marine licensable activities that are ongoing or upcoming, and with medium to high-risk pressure impact pathways as permitted fishing activity. As the models were run using ArcGIS in August 2023, any licences that ended before this date were screened out of the assessment.

The North Sea Transition Authority (NSTA) is responsible for regulating the oil, gas and carbon storage industries, and as such these activities fall outside of MMO's marine licensing remit. Oil, gas and carbon storage industry activities are not currently considered in this draft assessment, as information on the potential pressures exerted by associated activities is currently under review, and the likelihood of these activities resulting in an in-combination adverse effect on site integrity with fishing is expected to be very low. Following formal consultation, relevant oil, gas and carbon storage industry activities that could impact the site in-combination with the effects of assessed fishing activities will be included before finalising this assessment, alongside marine licence applications submitted after August 2023.

Bottom towed gear were identified in Part B as requiring management to avoid adverse effects to site integrity. Anchored nets and lines, and traps, are the only remaining fishing activities occurring within Swallow Sand MPA that interact with the seabed. In-combination effects of these fishing activities as well as these activities in-combination with other relevant activities will be assessed in this section.

In accordance with the methodology detailed above, ArcGIS identified three licences regarding cable protection and physical sampling, within the 5 km buffer applied.

Table 6 show the activities and the relevant categories from the JNCC Pressures-Activities Database (PAD)[13].

Table 6: summary of marine licensable activities and associated PAD categories.

Marine licence case reference number[14]	PAD Category	Description
MLA/2013/00436/4	Power cable: Laying, burial, and protection	National Grid, Norway-UK interconnector, cable protection inshore and offshore cable corridor. Overlaps northwestern corner of the MPA. **Potential in-combination effects.**
MLA/2020/00458/1	Telecommunication cable: Laying, burial, and protection	NO-UK fibre optic cable system, rock placement at the Langeled location, overlaps the southeastern corner of the MPA. **Potential in-combination effects.**
MLA/2023/00177	Physical sampling	Morven offshore wind geotechnical and benthic survey. Licence end date 10/10/2024 overlaps the Western edge of the MPA. However associated documents with the licence application state that no vibrocore or grab samples will be taken within the boundaries of the MPA. **No potential in-combination effects.**

[13] JNCC Pressures-Activities Database (PAD): hub.jncc.gov.uk/assets/97447f16-9f38-49ff-a3af-56d437fd1951)

[14] Details on the marine licence activities can be viewed on the public register of marine licence applications and decisions, searching by the marine licence case reference numbers: Marine case management system - Public register - MCMS (marinemanagement.org.uk) URL: https://marinelicensing.marinemanagement.org.uk/mmofox5/fox/live/MMO_PUBLIC_REGISTER (Last accessed 27 August 2024).

The PAD and Table 3 from **section 3.3**, were used to identify medium-high risk pressures exerted by fishing and non-fishing activities to identify those which require in-combination assessment (**Table 7**).

Table 7 summarises the pressures exerted by fishing and non-fishing activities and identifies those exerted by both (Y: pressure exerted). Activity-pressure interactions are highlighted dark blue to illustrate an in-combination effect. Only fishing activity with no proposed or current fisheries management in place are considered.

Table 7: Pressures exerted by fishing and non-fishing activities.

	Non-fishing activities		Fishing activities	
Potential pressures	**Telecommunication cable: laying, burial and protection**	**Power cable: laying, burial and protection**	**Anchored nets and lines**	**Traps**
Abrasion or disturbance of the substrate on the surface of the seabed	Y	Y	Y	Y
Removal of non-target species			Y	Y
Removal of target species			Y	Y

5.1 In-combination pressure sections

Fisheries vs fisheries in-combination pressures will be considered in this section. The pressures exerted by the non-fishing activity will also be considered in-combination with the anchored nets and lines and traps fishing pressures.

5.2 Fishing vs Fishing in-combination pressures

5.2.1 Abrasion and disturbance of the substrate on the surface of the seabed and Removal of target and non-target species

As noted in Part B (**Section 4.3.1** nets and lines and **Section 4.3.3** traps), impacts from the removal of target and non-target species pressure is not being considered in detail in this assessment. In-combination impacts from the removal of target and non-target species pressures are more fully assessed under the pressure abrasion, as the detail of key structural and influential species is yet to be fully defined. Therefore, the removal pressures are not considered further in this in-combination assessment. The pressures may require further consideration as future evidence becomes available, in conjunction with updated conservation advice from JNCC and Natural England.

The annual average VMS records for over 12 m vessels within the MPA totalled 3 counts (3 counts for anchored nets and lines, and 0 counts for traps). For under 12

m vessels, between 2016 and 2021, the annual average fishing effort estimated to have been derived from the MPA via traps and anchored nets and lines was 0.29 days (<0.01 days for anchored nets and lines, and 0.29 days for traps, Annex 1). For the same period (2016-2020), the total fishing effort (under 12s) estimated to have been derived from the MPA were 1.71 days (<0.01 for anchored nets and lines, and 1.71 for traps). The fishing effort data is further supported by the estimated live weight landings for under 12 m vessels (UK only) that equal an annual average of <0.01 tonnes (<0.01 tonnes for anchored nets and lines, and <0.01 tonnes for traps), between 2016 and 2020.

The combined impacts from anchored nets and lines and traps could potentially increase the risk of negative effects from the pressures, abrasion and disturbance, and removal of target and non-target species. However, due to the annual average of anchored nets and lines and traps effort being low (0.29 days) any in-combination impact is considered insignificant.

Therefore, the MMO concludes that the combined pressures from anchored nets and lines and traps will not result in a significant risk of hindering the conservation objectives for Swallow Sand MPA at the levels described.

5.3 Fishing vs non-fishing activities in-combination pressures

5.3.1 Abrasion and disturbance of the substrate on the surface of the seabed

The designated features of Swallow Sand MPA are sensitive to physical damage through surface abrasion and disturbance of the substrate from anchored nets and lines, and traps during gear deployment, movement of the gear on the seabed due to tidal movements and storm activity, and as the gear is dragged along the seabed during retrieval.

The National Grid licence for cable protection for the Norway-UK interconnector (MLA/2013/00436/4) overlaps with the north-western corner of Swallow Sand MPA creating potential for in-combination effects in relation to trenching and jetting activities. The cable footprint within the MPA is 0.026 km², which compared to the size of the MPA (4,746 km²) equates to less than 0.001 % of the MPA. Placement of rock protection to an area of subtidal gravel, sand and gravel also will mean a low level of change to existing habitat.

The NO-UK interconnector cable protection licence (MLA/2020/00458/1) will result in placement of rocks along the pipeline which cuts through the southeastern corner of the MPA, causing disturbance to designated features. The rock placement will be 202 m², which equates to 0.00009% of the MPA over an area of sandy mud habitat.

As detailed in section 3.3 abrasion and disturbance of seabed surface substrate, at current activity levels anchored nets and lines and traps are not considered to be causing significant pressure through abrasion and disturbance. It is possible that the

activities linked to the protection of Norway-UK interconnector and NO-UK fibre optic cable, in-combination with anchored nets and lines and traps may increase the potential for this pressure to have negative cumulative effects on the designated features of the MPA. However, given the small spatial scale of the seabed footprint from anchored nets and lines, and traps and the non-fishing activities, it is unlikely there would be an adverse effect on site integrity. Therefore, the scale of the in-combination impacts from abrasion and disturbance of the substrate on the surface of the seabed between anchored nets and lines and traps and non-fishing activity is considered insignificant.

There are other operational submarine cables and pipelines within the MPA, (including the GASSCO Langeled pipeline, CATS Everest to Teesside (cats trunkle), and CONCOPHILIPS EKOFISK 2/4 J to Teesside) which are already in-situ and are unlikely to have any residual abrasion/removal pressure in-combination with the assessed fishing activity. Any abrasion/removal pressure from submarine cable or pipeline operation and maintenance activity is unlikely to have a significant risk of in-combination impacts with the assessed fishing activity.

Therefore, the MMO concludes that the combined pressures from anchored nets and lines and traps and other relevant activities will not cause a significant risk of hindering the site conservation objectives for Swallow Sand MPA.

5.4 Part C conclusion

MMO concludes that different fishing gear types in combination and fishing in-combination with other relevant activities will not result in a significant risk of hindering the site conservation objectives of Swallow Sand MPA.

Further management measures will not therefore be implemented for fishing activities currently occurring within the MPA.

6 Conclusion and proposed management

Part A of this assessment concluded that anchored nets and lines, bottom towed gears, and traps, alone, are likely to have a significant effect on the designated features of Swallow Sand MPA.

Part B of this assessment concluded that, at the activity levels described, use of bottom towed gear on the sedimentary features of Swallow Sand MPA may cause an adverse effect on site integrity of the MPA as a result of the impacts of abrasion or disturbance, penetration and smothering, siltation rate and suspended solid changes whilst anchored nets and lines, and traps will not.

Part C of this assessment concluded that, at the activity levels described, use of anchored nets and lines and traps, in combination with each other and with other relevant activities, will not result in an adverse effect on site integrity of the MPA.

To ensure that fishing activities do not result in an adverse effect on site integrity of the MPA, MMO will implement a byelaw to prohibit the use of bottom towed gear throughout Swallow Sand MPA.

Figure 2 shows the proposed management area in line with the conclusions set out above.

The boundaries of the proposed management area include an appropriate buffer zone to prevent direct damaging physical interactions between fishing activities and the designated features to be protected. The rationale for determining buffer size can be found in in Annex 2 of the Stage 3 MPA Site Assessment Methodology[3] document.

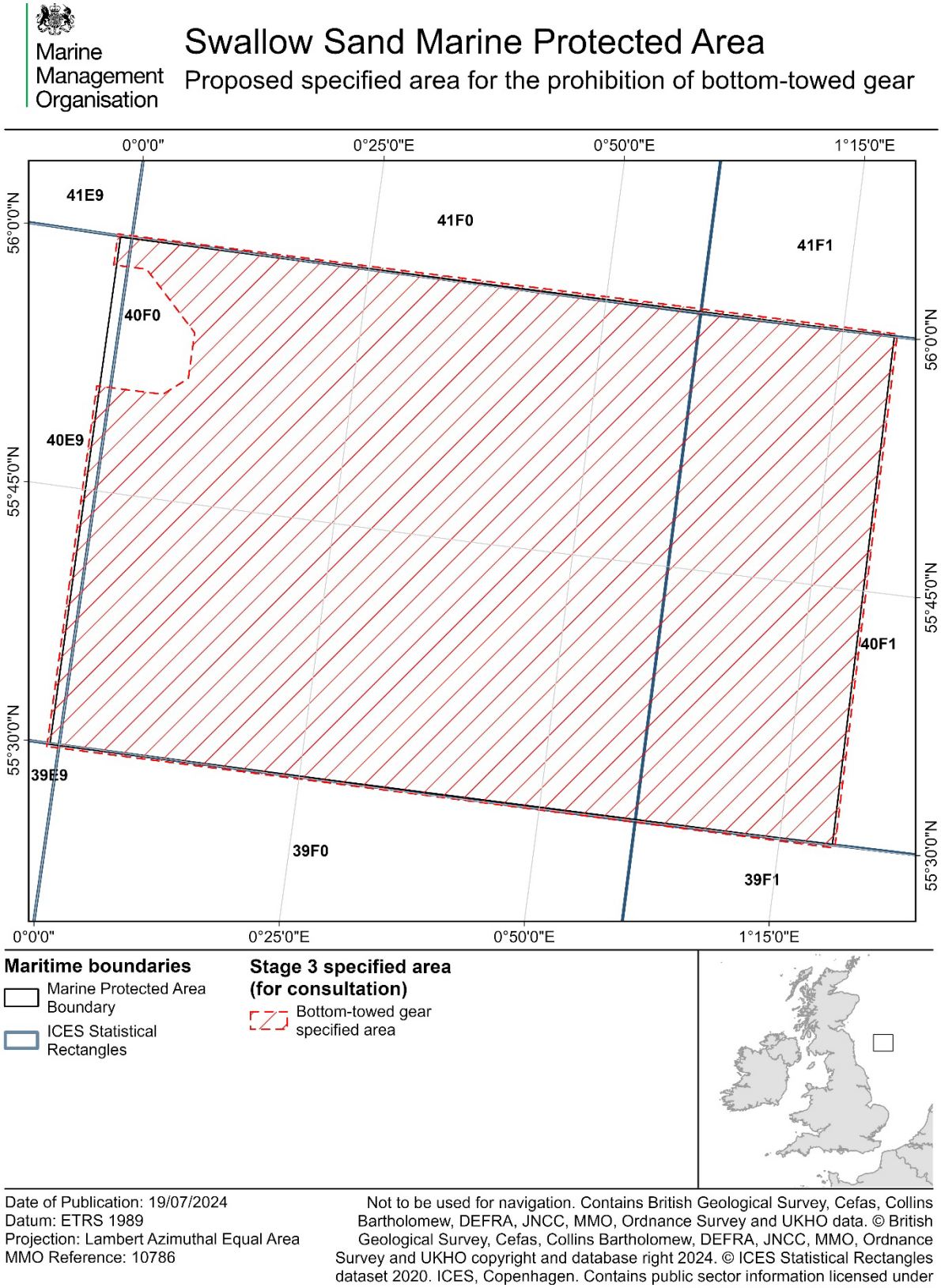

Figure 2: Map of proposed management.

7 Review of this assessment

MMO will review this assessment every five years, or earlier if significant new information is received. Such information could include:

- updated conservation advice
- updated advice on the condition of the site's feature(s)
- significant increase in activity levels

To coordinate the collection and analysis of information regarding activity levels, and to ensure that any required management is implemented in a timely manner, a monitoring and control plan will be implemented for this site. This plan will be developed in line with MMO's Monitoring and Control Plan framework.

References

Allen, C., Axelsson, M. and Dewey, S. (2016) *Community analysis of offshore MCZ grab and video data (2014). A report to JNCC by Seastar Survey Ltd. JNCC Report No. 588*, *JNCC Report No. 593*. Peterborough. Available at: hub.jncc.gov.uk/assets/c20ff00a-04ac-4eec-967e-d56f1feedbad.

Ashley, M. (2016) 'Maldanid polychaetes and Eudorellopsis deformis in offshore circalittoral sand or muddy sand', in Tyler-Walters, H. (ed.) *Marine Life Information Network: Biology and Sensitivity Key Information Reviews*. Plymouth. Available at: www.marlin.ac.uk/habitats/detail/1105.

Curtis, M., Hawes, J., Noble-James, T., Mitchell, P., Mason, C. and Jones, L. (2020) *Swallow Sand Marine Conservation Zone (MCZ) Monitoring Report 2016. JNCC/Cefas Partnership Report No. 31.* Peterborough. Available at: https://hub.jncc.gov.uk/assets/3fbf6d68-bc1b-40d3-a76b-de47ba1ed440.

De-Bastos, E. (2016) 'Paramphinome jeffreysii, Thyasira spp. and Amphiura filiformis in offshore circalittoral sandy mud', in Tyler-Walters, H. and Hiscock, K. (eds) *Marine Life Information Network: Biology and Sensitivity Key Information Reviews*. Plymouth. Available at: www.marlin.ac.uk/habitats/detail/1109.

De-Bastos, E. (2023) 'Owenia fusiformis and Amphiura filiformis in offshore circalittoral sand or muddy sand', in Tyler-Walters, H. (ed.) *Marine Life Information Network: Biology and Sensitivity Key Information Reviews*. Plymouth. Available at: www.marlin.ac.uk/habitats/detail/381.

Hill, J.M., Tyler-Walters, H., Garrard, S.L. and Watson, A. (2023) 'Seapens and burrowing megafauna in circalittoral fine mud', in Tyler-Walters, H. and Hiscock, K. (eds) *Marine Life Information Network: Biology and Sensitivity Key Information Reviews*. Plymouth. Available at: www.marlin.ac.uk/habitats/detail/131.

Lark, R.M. (2014) *Mapping seabed sediments of Swallow Sand and South-West Deeps (West) MCZs.* Nottingham. Available at: https://nora.nerc.ac.uk/id/eprint/507070/1/OR14015.pdf.

Tillin, H.M., Hughes, E., Readman, J.A.J., Hiscock, K. and Last, E.K. (2020) *Assigning the EUNIS classifications to UK's Offshore Regional Seas*, *JNCC Report No. 647*. Peterborough. Available at: https://hub.jncc.gov.uk/assets/34032043-c2d5-4fe4-952e-3bfe211ca6eb.

Tillin, H.M. and Watson, A. (2023) 'Branchiostoma lanceolatum in circalittoral coarse sand with shell gravel', in Tyler-Walters, H. (ed.) *Marine Life Information Network: Biology and Sensitivity Key Information Reviews*. Plymouth. Available at: www.marlin.ac.uk/habitats/detail/244.

Annexes

Annex 1: Fishing activity data

Table A1.1: VMS record count per nation group (UK and EU Member State) and proportional activity (%), per gear, per gear group, per year (2016 to 2021), totals and annual average 2016 to 2021 in Swallow Sand MPA.

			2016		2017		2018		2019		2020		2021		Total (2016 to 2021)		Annual average (2016 to 2021)
Gear group	**Gear code**	**Nation group**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**
Anchored Net/Line	GNS	EU Member State	3	100	15	100	0	0	0	0	0	0	0	0	18	100	3
	GNS Total		**3**	**100**	**15**	**100**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**18**	**100**	**3**
Anchored Net/Line Total			**3**	**1**	**15**	**7**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**18**	**2**	**3**
Demersal Seine	SSC	UK	0	0	0	0	0	0	0	0	13	100	2	100	15	100	3
	SSC Total		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**13**	**100**	**2**	**100**	**15**	**100**	**3**
Demersal Seine Total			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**13**	**5**	**2**	**2**	**15**	**1**	**3**
Demersal trawl	OTB	EU Member State	6	8	44	43	65	97	56	59	18	11	20	57	209	38	35
	OTB	UK	70	92	59	57	2	3	39	41	149	89	15	43	334	62	56

			2016		2017		2018		2019		2020		2021		Total (2016 to 2021)		Annual average (2016 to 2021)
Gear group	**Gear code**	**Nation group**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**
	OTB Total		**76**	**78**	**103**	**64**	**67**	**65**	**95**	**80**	**167**	**77**	**35**	**45**	**543**	**70**	**91**
	OTT	EU Member State	0	0	0	0	0	0	3	13	0	0	0	0	3	1	1
	OTT	UK	21	100	57	100	29	100	21	88	49	100	42	100	219	99	37
	OTT Total		**21**	**22**	**57**	**36**	**29**	**28**	**24**	**20**	**49**	**23**	**42**	**55**	**222**	**29**	**37**
	TBN	UK	0	0	0	0	7	100	0	0	0	0	0	0	7	100	1
	TBN Total		**0**	**0**	**0**	**0**	**7**	**7**	**0**	**0**	**0**	**0**	**0**	**0**	**7**	**1**	**1**
Demersal trawl Total			**97**	**42**	**160**	**70**	**103**	**61**	**119**	**62**	**216**	**86**	**77**	**93**	**772**	**67**	**129**
Midwater – surrounding	**PS**	EU Member State	0	0	2	100	19	100	16	100	2	100	0	0	39	100	7
	PS Total		**0**	**0**	**2**	**100**	**19**	**100**	**16**	**100**	**2**	**100**	**0**	**0**	**39**	**100**	**7**
Midwater - surrounding Total			**0**	**0**	**2**	**1**	**19**	**11**	**16**	**8**	**2**	**1**	**0**	**0**	**39**	**3**	**7**
Midwater Trawl	OTM	EU Member State	21	100	49	100	34	83	57	100	5	100	4	100	170	96	28

			2016		2017		2018		2019		2020		2021		Total (2016 to 2021)		Annual average (2016 to 2021)
Gear group	**Gear code**	**Nation group**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**
	OTM	UK	0	0	0	0%	7	17	0	0	0	0	0	0	7	4	1
	OTM Total		**21**	**100**	**49**	**100**	**41**	**100**	**57**	**100**	**5**	**100**	**4**	**100**	**177**	**100**	**30**
Midwater Trawl Total			**21**	**9**	**49**	**21**	**41**	**24**	**57**	**30**	**5**	**2**	**4**	**5**	**177**	**15**	**30**
Unknown	NK	EU Member State	0	0	0	0	0	0	1	100	0	0	0	0	1	1	0
	NK	European Free Trade Association	99	90	4	100	7	100	0	0	14	100	0	0	124	91	21
	NK	#N/A	11	10	0	0	0	0	0	0	0	0	0	0	11	8	2
	NK Total		**110**	**100**	**4**	**100**	**7**	**100**	**1**	**100**	**14**	**100**	**0**	**0**	**136**	**100**	**23**
Unknown Total			**110**	**48**	**4**	**2**	**7**	**4**	**1**	**1**	**14**	**6**	**0**	**0**	**136**	**12**	**23**
Grand Total			**231**	**0**	**230**	**0**	**170**	**0**	**193**	**0**	**250**	**0**	**83**	**0**	**1157**	**0**	**195**

Table A1.2: UK live weight landings tonnage (t) estimates by gear from vessels over 12 m in length in Swallow Sand MPA (2016 to 2020).

Gear group	Gear code	2016	2017	2018	2019	2020	Total (2016 to 2020)	Annual average (2016 to 2020)
Demersal seine	SSC	0	0	0	0	7.54	7.54	1.51
Demersal seine total		**0**	**0**	**0**	**0**	**7.54**	**7.54**	**1.51**
Demersal trawl	OTB	6.05	7.30	1.08	15.51	32.84	62.77	12.55
	OTT	3.43	7.43	4.31	4.37	9.45	28.99	5.80
	TBN	0	0	0.78	0	0	0.78	0.16
Demersal trawl total		**9.49**	**14.73**	**6.17**	**19.88**	**42.28**	**92.54**	**18.51**
Midwater trawl	OTM	0.00	0.00	247.77	0	0	247.77	49.55
Midwater trawl total		**0.00**	**0.00**	**247.77**	**0**	**0**	**247.77**	**49.55**
Grand total		**9.49**	**14.73**	**253.93**	**19.88**	**49.83**	**347.85**	**69.57**

Table A1. 3: EU27 live weight landings tonnage (t) estimates by gear from vessels over 12 m in length in Swallow Sand MPA (2016 to 2020).

Gear group	Gear code	2016	2017	2018	2019	2020	Total (2016 to 2020)	Annual average (2016 to 2020)
Anchored net/line	GNS	0	0.32	0	0	0	0.32	0.06
Anchored net/line total		**0**	**0.32**	**0**	**0**	**0**	**0.32**	**0.06**
Demersal trawl	OTB	56.09	1,246.14	667.44	117.62	124.10	2,211.39	442.28
Demersal trawl total		**56.09**	**1,246.14**	**667.44**	**117.62**	**124.10**	**2,211.39**	**442.28**
Midwater trawl	OTM	203.63	198.37	55.18	944.53	86.76	1,488.47	297.69
Midwater trawl total		**203.63**	**198.37**	**55.18**	**944.53**	**86.76**	**1,488.47**	**297.69**
Grand total		**259.72**	**1,444.84**	**722.62**	**1,062.15**	**210.86**	**3,700.19**	**740.04**

Table A1.4: Percentage of each ICES rectangle intersected by Swallow Sand MPA.

ICES rectangle	Percentage overlap (%)
39E9	<0.01
39F0	0.02
40E9	1.79
40F0	99.90
40F1	34.02
41F0	0.01
41F1	0.04

Table A1.5: UK live weight landings tonnage (t) estimates by gear from vessels under 12 m in length for Swallow Sand MPA (2016 to 2020).

Gear group	Gear code	2016	0	2018	2019	2020	Total (2016 to 2020)	Annual average (2016 to 2020)
Anchored net/line	LL	<0.01	0	0	0	0	<0.01	<0.01
Anchored net/line total		**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**
Demersal trawl	OT	<0.01	<0.01	0	0	0	<0.01	<0.01
	OTB	0.00	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	TBB	0	0	0	0	<0.01	<0.01	<0.01
	TBN	<0.01	<0.01	<0.01	<0.01	0	<0.01	<0.01
Demersal trawl total		**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**0.01**
Dredge	DRB	0	<0.01	0	<0.01	0	<0.01	<0.01
Dredge total		**0**	<0.01	**0**	<0.01	**0**	<0.01	<0.01
Midwater - gill drift	GND	<0.01	0	0	0	0	<0.01	<0.01
Midwater - gill drift total		**<0.01**	**0**	**0**	**0**	**0**	**<0.01**	**<0.01**
Midwater hook/lines	LHP	0	0	0	0	0	0	0
	LX	0	0	0	0	0	<0.01	<0.01

Gear group	Gear code	2016	0	2018	2019	2020	Total (2016 to 2020)	Annual average (2016 to 2020)
Midwater hook/lines total		**0**	**0**	**0**	**0.01**	**0**	**0.01**	**<0.01**
Traps	FPO	<0.01	<0.01	<0.01	0.01	0.01	0.02	<0.01
Traps total		**<0.01**	**<0.01**	**<0.01**	**0.01**	**0.01**	**0.02**	**<0.01**
Grand total		**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**

Table A1.6: Mean annual surface and subsurface swept area ratio (SAR) values for C-squares intersecting the MMO section of Swallow Sand MPA (2016 to 2020).

Gear group	SAR category	2016	2017	2018	2019	2020
Demersal seine	Surface	<0.01	0	0	0	<0.01
	Subsurface	0	0	0	0	0
Demersal trawl	Surface	0.02	0.01	0.01	0.02	0.05
	Subsurface	0.01	0.01	<0.01	<0.01	0.01
Dredge	Surface	0	0	0	0	0
	Subsurface	0	0	0	0	0
All BTG	Surface	0.02	0.02	<0.01	0.02	0.07
	Subsurface	0.01	0.01	0	0	0.01

Table A1.7: Fishing effort (days) recorded by UK vessels under 12 m in length, separated by gear type for the area of Swallow Sand MPA that intersects the marine portion of ICES rectangle 40E9 (2016 to 2021). ICES rectangle 40E9 is the only ICES rectangle that overlaps Swallow Sand MPA containing any fishing effort data from these vessels. ICES rectangle level data has been apportioned to the MPA based on the percentage area of the ICES rectangle that intersects the MPA. (Table A1.4).

Gear group	Fishing effort (days at sea)							
	2016	2017	2018	2019	2020	2021	Total (2016 to 2021)	Annual average (2016 to 2021)
Demersal trawl	<0.01	0.05	<0.01	<0.01	<0.01	<0.01	0.06	0.01
Dredge	0	<0.01	0	<0.01	0	0	<0.01	<0.01
Bottom towed gear total	**<0.01**	**0.05**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**0.06**	**0.01**
Midwater gill drift	>0	0	0	0	0	0	<0.01	<0.01
Midwater hooks and lines	0	0	0	0.01	0	0	0.01	<0.01
Midwater gear total	**<0.01**	**0**	**0**	**0.01**	**0**	**0**	**0.01**	**<0.01**
Traps	>0	>0	0.02	0.01	0.04	1.65	1.71	0.29
Anchored nets and lines	>0	0	0	0	0	0	>0	>0
Static gear total	**>0**	**>0**	**>0**	**0.01**	**0.04**	**1.65**	**1.71**	**0.29**
MPA total	**>0**	**0.05**	**0.02**	**0.02**	**0.04**	**1.65**	**1.78**	**0.30**