Marine Management Organisation

MMO Stage 3 Site Assessment: Shell Flat and Lune Deep MPA (DRAFT)






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Title: MMO Stage 3 Site Assessment: Shell Flat and Lune Deep MPA (DRAFT)

Contents

Executive Summary

This assessment analyses the impact of anchored nets and lines, bottom towed gear, and traps on the subtidal sand sub-feature of the designated feature sandbanks which are slightly covered by seawater all the time, and potential Annex 1 reef, in the Shell Flat section of Shell Flat and Lune Deep Marine Protected Area (MPA) to determine whether an adverse effect on site integrity can be excluded. The assessment sets out the evidence considered and analyses the quality of that evidence. **The assessment finds that at the activity levels described, anchored nets and lines, and traps will not result in an adverse effect on site integrity for Shell Flat MPA. As such, the Marine Management Organisation (MMO) concludes that management measures for these gear types are not required. Bottom-towed-gear, however, despite activity levels described, may result in an adverse effect on site integrity, as such MMO concludes that management measures are required for this gear type.**

1 Introduction

This assessment considers whether fishing activities are compatible with the conservation objectives of the Shell Flat section of Shell Flat and Lune Deep MPA.

Although MMO is responsible only for the area of the MPA beyond 6 nautical miles (nm), in the interest of continuity and compliance, it has been agreed with North Western Inshore Fisheries and Conservation Authority (IFCA) that MMO will assess Shelf Flat MPA as a whole and not just the section beyond 6 nm. North Western IFCA will maintain management of Lune Deep however. As such, the assessment from this point will refer only to 'the MPA', 'the site' or 'Shell Flat'.

This site is designated as a special area of conservation (SAC). This assessment uses the best available evidence to review site characteristics and fishing activity and determine if fishing activity is causing an adverse effect on the integrity 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 Natural England conservation advice package was used for background on site geography, designations, features, and conservation objectives in this assessment:

- Natural England conservation advice package – Shell Flat and Lune Deep MPA[1]

Shell Flat MPA is located in the Irish Sea between 3 and 20 km off the Lancashire Coast, at the mouth of Morecambe Bay and covers an area of 106 square kilometres (km^2). The site overlaps the Special Protection Area (SPA) Liverpool Bay SPA. It straddles the 6 nm limit and fishing in the site is regulated by North Western Inshore Fisheries and Conservation Authority (IFCA) (0 to 6 nm) and MMO (beyond 6 nm) and its relevant statutory nature conservation body is Natural England (0 to 12 nm) **Figure 1**.

[1] Natural England Conservation Advice for Marine Protected Areas, Shell Flat and Lune Deep SAC - UK0030376 designatedsites.naturalengland.org.uk/Marine/MarineSiteDetail.aspx?SiteCode=UK0030376, (Last accessed 25 May 2023)

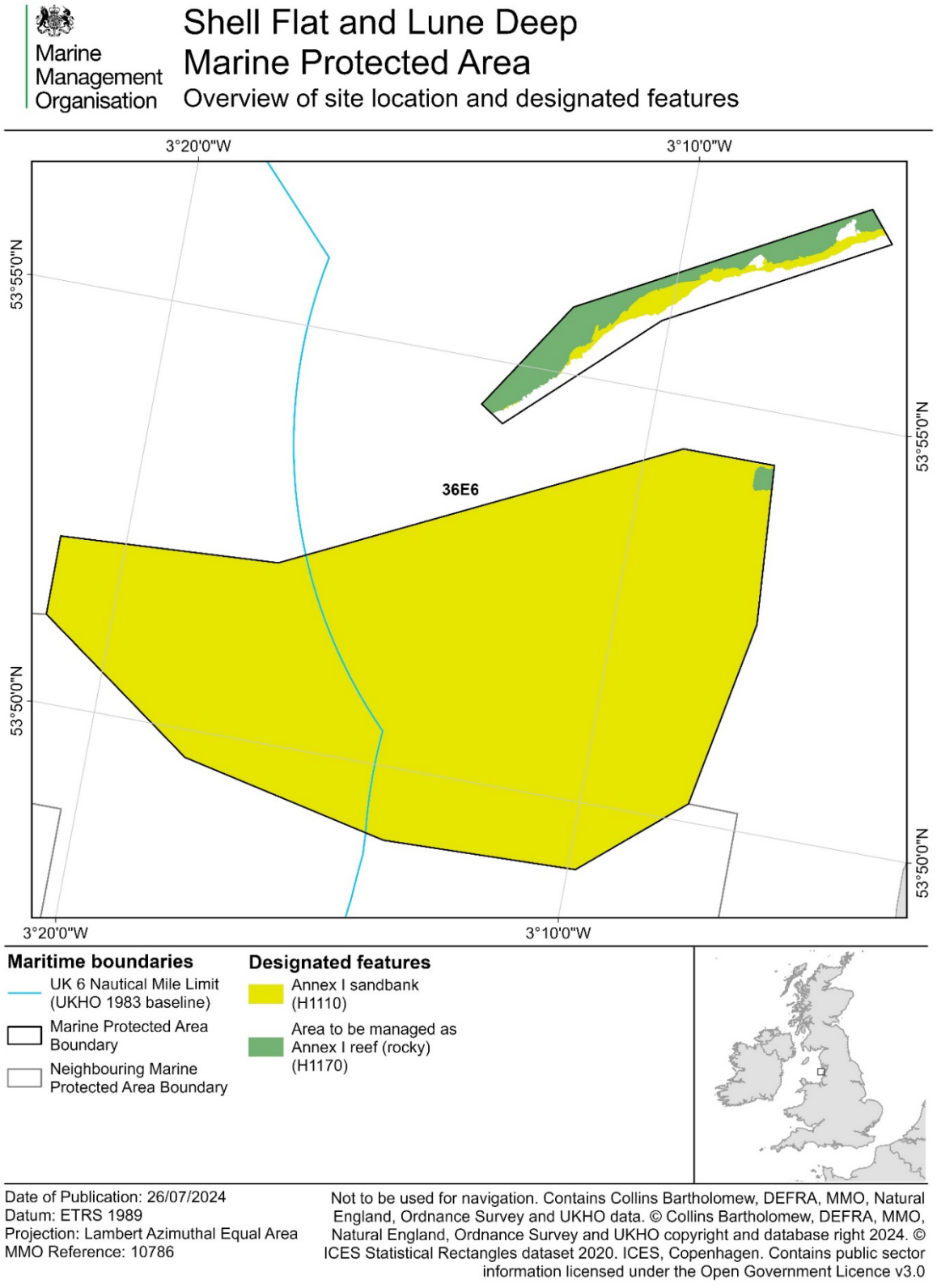

Figure 1: Shell Flat MPA location overview.

Shell Flat MPA was designated as a Special Area of Conservation (SAC) in 2017. The site is comprised of a large subtidal sandbank feature and a small portion of potential Annex 1 reef to the Eastern point of Shell Flat.

Shell Flat is characterised by a large number of individuals of just a few species typical of sandy substrates including bivalve molluscs such as *Nucula nitidosa*, *Pharus legumen*, *Abra alba* and *Fabulina fabula*, as well as the bristle worms *Magelona johnstoni*, *Glycera alba* and *Magelona filiformis.* It is an important site in the UK for wintering common scoter *Melanitta nigra* feeding on the submerged sandbank. Subtidal mud is a minor component of the sandbank forming a small area in the south (circalittoral sandy mud). Shell Flat is composed of the *Fabulina fabula* and *Magelona mirabilis* biotope in the fine shallower sediments of the bank, with *Abra alba* and *Nucula nitidosa* biotope occurring in the slightly muddier sediments found on the slopes and in deeper areas of the bank.

The designated features and their conservation objectives are set out in **Table 1**. The conservation objectives for the features of Shell Flat MPA have been set based on a vulnerability assessment.

Table 1: Designated features, including supporting habitats, and conservation objectives.

Designated feature	Sub-feature	Conservation objective
Potential Annex 1 reef	Circalittoral rock	Restore the integrity of the site.
	Subtidal stony reef	
Sandbanks which are slightly covered by sea water all the time	Subtidal mud	
	Subtidal sand	

The restore objective noted in **Table 1** is given more detail in the Natural England supplementary advice on conservation objectives – Shell Flat and Lune Deep MPA[1];. Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

- The extent and distribution of qualifying natural habitats;
- The structure and function (including typical species) of qualifying natural habitats; and
- The supporting processes on which the qualifying natural habitats rely.

Natural England conducted condition assessments in 2024 and reported the condition of both designated features, sandbanks, and reefs, as favourable

condition. More information on this can be found in Natural England feature condition – Shell Flat and Lune Deep MPA[2].

2.2 Scope of this assessment

The scope of this assessment covers fishing activities alone, and relevant plans or projects in combination with fishing.

[2] Natural England feature condition – Shell Flat and Lune Deep MPA designatedsites.naturalengland.org.uk/Marine/MarineFeatureConditionDirect.aspx?SiteCode=UK0030376&SiteName=Shell%20Flat&SiteNameDisplay=Shell%20Flat%20and%20Lune%20Deep%20SAC&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality= (Last accessed 28 June 2024)

3 Part A - Identified pressures on the MPA

Part A of this assessment was carried out in a manner that is consistent with the 'likely significant effect (LSE)' test required by regulation 63 of the Conservation of Habitats and Species Regulations 2017[3].

Part A assesses the interactions between pressures from fishing gears and 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 effect/impact of the pressure is not likely to be significant; 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 potential scale or magnitude of any effect is likely to be significant;
    c. if it is not possible to determine whether the magnitude of any effect is likely to be significant; 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 have been screened out of 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.

[3] For more information: Conservation of Habitats and Species Regulations 2017 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);
- swept area ratio (SAR) data.

For more information about the above evidence sources, please see the MPA Site Assessment Methodology document[4], which describes each type of fishing activity evidence and summarises the strengths and limitations of each source.

[4] 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 Shell Flat MPA.

Gear Type	Gear name	Gear code	Justification
Anchored nets and lines	Gill nets (not specified)	GN	Present in under 12 m vessel landings data for ICES statistical rectangle that overlaps the site.
	Gillnets and entangling nets	GEN	
	Longline (unspecified)	LL	
	Set gillnet (anchored)	GNS	
	Trammel net	GTR	
Bottom towed gear	Bottom otter trawl	OTB	Present in VMS and in under and over 12 m vessel landings data for ICES statistical rectangle that overlaps the site.
	Beam trawl	TBB	Present in under 12 m vessel landings data for ICES statistical rectangle that overlaps the site.
	Nephrops trawl	TBN	Present in under 12 m vessel landings data for ICES statistical rectangles that overlap the site.
	Otter trawls (unspecified)	OT	
	Towed dredge	DRB	
	Twin bottom otter trawl	OTT	Present in under 12 m vessel landings data for ICES statistical rectangles that overlap the site.
Midwater gear	Drift gillnet	GND	Present in under 12 m vessel landings data for ICES statistical rectangle that overlaps the site.
	Hand-operated pole-and-line	LHP	
	Hook and line (unspecified)	LX	
Miscellaneous	Miscellaneous	MIS	Present in under 12 m vessel landings data for ICES statistical rectangle that overlaps the site.
Traps	Pot/Creel	FPO	Present in VMS records and under 12 m vessel landings data for ICES statistical rectangles that overlap the site.

3.2 Activities screened out

This section identifies activities and features that are **occurring but do not need to be considered** for Shell Flat MPA.

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

- **Midwater gears:** although the use of midwater gears does occur within Shell Flat MPA, there is no feasible pathway for gears of this type to interact with benthic designated features. These gears 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 Shell Flat MPA is not considered to be capable of affecting the designated features other than insignificantly and is not considered further within this assessment.
- **Unknown gear:** 'other gear' or 'miscellaneous 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 each of the Impacts Evidence documents[5]:

- Stage 3 Fishing Gear MPA Impacts Evidence Anchored Nets and Lines[6];
- Stage 3 Fishing Gear MPA Impacts Evidence Bottom Towed Gear[7]; and

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

- Stage 3 Fishing Gear MPA Impacts Evidence Traps[8].

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 Natural England 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.

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.

[8] 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 Shell Flat MPA to be taken forward to Part B.

Potential pressures	Sub-features of Designated features											
	Subtidal sand			Subtidal mud			Subtidal stony reef			Circalittoral rock		
	A	B	T	A	B	T	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 sediment type)												
Physical change (to another seabed type)												

Potential pressures	Sub-features of Designated features											
	Subtidal sand			Subtidal mud			Subtidal stony reef			Circalittoral rock		
	A	B	T	A	B	T	A	B	T	A	B	T
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 'appropriate assessment' required by regulation 63 of the Conservation of Habitats and Species Regulations 2017 and regulation 28 of the Conservation of Offshore Marine Habitats and Species Regulations 2017.

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 Shell Flat and Lune Deep MPA conservation advice package and are shown in **Table 4**.

Table 4: Relevant favourable condition targets for identified pressures.

(* Indicates pressures relevant only to bottom towed gear. All others relevant to bottom towed gear, anchored nets and lines, and traps.)

Feature	Attribute	Target	Relevant pressures
Subtidal sand **Subtidal mud** (sub-features of 'Sandbanks which are slightly covered by sea water all the time') **Potential Annex 1 reef**	Distribution Extent and distribution Structure Supporting processes	Maintain	Abrasion or disturbance of the substrate on the surface of the seabed Changes in suspended solids (water clarity)* Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion* Removal of non-target species Removal of target species* Smothering and siltation rate changes (light)*
	Structure and Function	tbc.	
	Structure – non-native species and pathogens (habitat) Supporting Processes – sediment contaminants Supporting Processes – water quality – contaminants (habitat)	Restrict Reduce	

4.1 Fisheries access and existing management

Non-UK vessels can operate within Shell Flat MPA, provided that they have a licence issued by the UK to do so. There are no records from VMS data of different nationalities fishing within the MPA from 2016 to 2020 included. There were EU under 12 m records in landings but no details on nationality. EU vessels no longer have access to 6 to 12 nm in this area; however, UK vessels may replace this previous activity from EU vessels.

There are no management measures currently in the MMO section of the MPA. The IFCA section is subject to several legislative catch restrictions that are district wide and one that has measures in place specifically for Shell Flat MPA. For more information please see Kingfisher website[9]. There is a NW IFCA byelaw which is a closed area for reef in Shell Flat.

More information on non-UK vessel access to UK waters can be found on MMO's Single Issuing Authority page[10].

4.2 Fishing activity summary

Table A1. 1 to Table A1. 8 in Annex 1 display a detailed breakdown of fishing activity within Shell Flat MPA. Of the fishing activities not screened out in Part A of this assessment, the only gears operating from over 12 m vessels within the site are demersal trawls (specifically bottom otter trawl), and traps (specifically pots and creels). Demersal trawls accounted for 44 % of VMS counts between 2016 and 2021 whilst traps accounted for 56 %. Both gear types were at very low levels with an average of 3 and 4 VMS records per year respectively. As for live weight landings estimates, demersal trawl had an average of 0.6 tonnes per year and traps 1.22 tonnes. Spatially, demersal trawls activity between 2016 and 2020 was concentrated primarily in the Western three-quarters of Shell Flat MPA, whilst traps were scattered across the site.

In relation to the combined UK and EU activity from under 12 m vessels, traps accounted for the highest proportion of live weight landings estimates at 56 % of all under 12 m gear. Demersal trawls accounted for 20.4 %, anchored nets and lines 16.4 % and dredges 4 %. Like over 12 m activity, all under 12 m activity was again at low levels with an average live weight landings estimates of 0.39 tonnes per year for traps, 0.14 for demersal trawls, 0.11 for anchored nets and lines and 0.03 for dredges. For under 12 m vessels fishing effort, anchored nets and lines had a total of

[9] Kingfisher fishing restrictions map; kingfisherrestrictions.org/fishing-restriction-map
[10] The UK Single Issuing Authority: www.gov.uk/guidance/united-kingdom-single-issuing-authority-uksia (Last accessed 04 October 2023).

11.09 days between 2016 and 2020, whilst bottom towed gear had 7.86 days and traps 5.78 days.

Surface SAR values for C-squares intersecting Shell Flat MPA for demersal trawl ranged between 0.03 and 0.1 for the period between 2016 and 2020, whilst subsurface values were 0.01 each year between 2017 and 2019. A SAR value of 1 means that each area C-square experiences a pass of fishing gear on average once a year. A value of 0.11 means that at this current level of activity, it would take approximately 9 and a half years for the whole site to be swept once.

4.3 Pressures by gear type

The Stage 3 Fishing Gear MPA Impacts Evidence documents for anchored nets and lines[6], bottom towed gear[7] and traps[8] 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, conservation objectives, intensity of fishing activity taking place and exposure to natural disturbance.

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.

Impacts from target and/or non-target removal pressures have been scoped out from this assessment in most cases, as the detail of key structural and influential species is yet to be fully defined and they are assessed more completely within the abrasion and penetration pressures. These pressures may require consideration as a result of any future evidence review, in conjunction with updated conservation advice from Natural England. Where separate consideration of these pressures is required, this has been stated.

There is limited survey information available for this site so available information has been used regarding which biotopes are present. Information about the biotopes in the site was extracted from the NE Advice on Operations for Shell Flat and Lune Deep MPA[1] in relation to relevant designated features, gear types and pressures. Sensitivity information was extracted from Marlin[11].

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

Using this information biotopes were screened out if they were not sensitive or had low sensitivity to the relevant pressures in **Table 4**. The resulting screened in biotopes are listed in **Table 5**.

Table 5: Biotopes in Shell Flat MPA to be considered.

Feature	Biotope name	Sensitivity
Subtidal mud	*Amphiura filiformis, Kurtiella bidentata* and *Abra nitida* in circalittoral sandy mud (De-Bastos and Hill, 2016)	Abrasion: medium
Subtidal sand	*Fabulina fabula* and *Magelona mirabilis* with venerid bivalves and amphipods in infralittoral compacted fine muddy sand (Tillin and Rayment, 2022)	Smothering: medium
	Abra alba and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment (Tillin and Budd, 2023)	
	Echinocardium cordatum and *Ensis* spp. in lower shore and shallow sublittoral slightly muddy fine sand (De-Bastos *et al.*, 2023)	Abrasion, penetration, changes in suspended solids, smothering: medium
Circalittoral rock / Subtidal stony reef	*Mytilus edulis* beds on reduced salinity infralittoral rock (Tillin, Mainwaring, *et al.*, 2023)	Abrasion, changes in suspended solids, smothering; medium
	Laminaria digitata and under-boulder fauna on sublittoral fringe boulders (Tillin, Stamp, *et al.*, 2023)	Abrasion, penetration; medium

Feature	Biotope name	Sensitivity
	Sabellaria reefs on circalittoral rock (Tillin, Gibb and Garrard, 2015)	
	Sabellaria spinulosa encrusted circalittoral rock (Tillin, Marshall, *et al.*, 2023a)	
	Sabellaria spinulosa with a bryozoan turf and barnacles on silty turbid circalittoral rock (Tillin, Marshall, *et al.*, 2023b)	
	Laminaria hyperborea and foliose red seaweeds on moderately exposed infralittoral rock (Stamp, Tyler-Walters and Burdett, 2023)	Abrasion, changes in suspended solids; medium
	Halidrys siliquosa and mixed kelps on tide-swept infralittoral rock with coarse sediment (Stamp *et al.*, 2021)	
	Laminaria hyperborea forest and foliose red seaweeds on moderately exposed upper infralittoral rock (Stamp, Burdett and Tyler-Walters, 2023)	
	Foliose red seaweeds on exposed lower infralittoral rock (Tillin, Budd, *et al.*, 2023)	Changes in suspended solids; medium

4.3.1 Anchored nets and lines

The relevant pressures on the designated features of Shell Flat MPA from anchored nets and lines were identified in **Table 4** and are:

- abrasion or disturbance of the substrate on the surface of the seabed;
- removal of non-target species; and
- removal of target species (reef and rock features only).

As noted, impacts from target and non-target removal pressures have been scoped out of this assessment, as they are assessed more completely within the abrasion and penetration pressures.

Subtidal sediments

Impacts on sediment features relating to abrasion or disturbance of the substrate on the surface of the seabed occur primarily from the footrope and anchors during the hauling of gear, and during movement along the seabed due to tides, currents or storms. As set out in section 9.3 of the anchored nets and lines Impacts Evidence document[6], abrasion impacts from this gear type are unlikely to negatively impact the extent or distribution of any sediment feature, or structure and function of the ecosystem in a significant manner due to the static nature of the gear type and small spatial footprint. Subtidal sediment habitats being considered as being resilient to all but intense fishing activity using anchored nets and lines, on species rich sediment habitats, or those with long-lived bivalves. There is therefore some potential for damage to the biological communities present in intensively fished areas. Abrasion impacts are considered likely to be greatest on subtidal mixed and coarse sediments compared to subtidal sand as the coarser habitats often contain populations of more sensitive sessile epifauna.

Table 5 lists those biotopes which may be present in Shell Flat MPA. One of the biotopes for subtidal mud has a medium sensitivity to abrasion. For subtidal sand there are three with medium sensitivity to smothering, and one with medium sensitivity to abrasion, penetration and suspended solids.

Subtidal stony reef and circalittoral rock

Impacts on reef features relating to abrasion or disturbance of the substrate on the surface of the seabed occur primarily from the footrope and anchors during the hauling of gear, and during movement along the seabed due to tides, currents or storms. As per section 7.3 of the anchored nets and lines Impacts Evidence document[6], while abrasion impacts from this gear type may cause sediment veneer disturbance and damage to epifaunal/epifloral communities, physical damage to the rock itself is unlikely. Some studies indicate that slow growing branching species and rock with erect branching species are considered particularly sensitive to damage from netting, whilst rock with low-lying fast growing faunal turf has been determined as having moderate sensitivity to moderate levels of netting. Repeated netting activity could damage reefs and the associated communities through cumulative damage.

Table 5 lists those biotopes which may be present in Shell Flat MPA. For circalittoral rock/subtidal stony reef, one biotope has medium sensitivity to abrasion, change in suspended solids and smothering. Four biotopes are medium to abrasion and penetration. Three are medium to abrasion and change in suspended solids and one biotope medium sensitivity to just changes in suspended solids.

Section 4.2 describes fishing activity within Shell Flat MPA, and notes that there are extremely low levels of anchored nets and lines within the site. There are no VMS records for anchored nets and lines within the site, and although anchored nets and lines make up 16.4 % of the weight of estimated landings from under 12 m vessels, they had an annual average of 0.11 tonnes between 2016 and 2020. The risk of abrasion and disturbance is limited, and lowest for subtidal sand. Whilst significant, it is considered that anchored nets and lines activity is unlikely to create heavy disturbance over an extensive range and hence the resilience of the communities should be maintained at these activity levels.

Therefore, **MMO concludes that at the activity levels described, the use of anchored nets and lines will not result in an adverse effect on site integrity for Shell Flat MPA.**

4.3.2 Bottom towed gear

The relevant pressures on the designated features of Shell Flat MPA from bottom towed gear were identified in **Table 4** and are:

- abrasion or disturbance of the substrate on the surface of the seabed$^{\Delta}$;
- penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion$^{\Delta}$;
- removal of non-target species;
- removal of target species (sediments only);
- smothering and siltation rate changes*; and
- changes in suspended solids (water clarity)* (except circalittoral rock).

As noted previously, impacts from target and non-target removal pressures have been scoped out of this assessment, as they are assessed more completely within the abrasion and penetration pressures. Pressures marked with matching superscript symbols (Δ and *) have been consolidated due to the similar nature of their impacts on the sediment features.

As described in **Section 4.3**, demersal trawling is the second most prevalent fishing gear from over 12 m vessels at 44 % of VMS counts between 2016 and 2021, primarily covering the Western three-quarters of the site, overlapping the designated features. The bottom towed gears, demersal trawling and dredging, also account for 24.4 % of landings from under 12 m vessels. Total live weight landings estimate for demersal trawling from over and under 12 m vessels combined was 0.74 tonnes per year. For demersal trawling, fishing effort for under 12 m vessels was 7.86 days in total for 2016 to 2020. The maximum SAR value for demersal trawling in the site was 0.1 in 2018. At this level of activity, it would take 9.5 years for the whole site to be swept once. Fishing activity data therefore demonstrates that fishing levels and intensities from bottom towed gear are low within Shell Flat MPA.

Subtidal sediments

Table 5 lists those biotopes which may be present in Shell Flat MPA. One of the biotopes for subtidal mud has a medium sensitivity to abrasion. For subtidal sand there are three with medium sensitivity to smothering, and one with medium sensitivity to abrasion, penetration and suspended solids.

'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'.

As outlined in section 8.5 of the Impacts Evidence document bottom towed gear[7], the abrasion and penetration pressures caused by bottom towed gears have both biological and physical impacts to sediment features, varying based on levels of activity and fishing intensity. Physical impacts range from the creation of furrows and berms in the sediment, to the flattening of bottom features such as ripples and the homogenisation of sediments. These 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 include damage and mortality to flora and fauna on the seabed via surface and subsurface abrasion and penetration, as well as long term shifts in biological communities towards smaller, short-lived, opportunistic species that exhibit greater resilience to anthropogenic activity. 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.

One of the biotopes within the subtidal mud feature that are present or possibly present in the site had medium sensitivity to abrasion and one had medium sensitivity to both abrasion and penetration.

Given the very low levels of bottom towed gear activity in the site, the level of abrasion and penetration at the activity levels described will not result in an adverse effect on site integrity.

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

Smothering, siltation rate and suspended solid changes occur when bottom towed gear connect with the seabed, causing the top layer of the sediment to mix with the surrounding water. This can affect the ability of some organisms to feed or breathe. The subsequent settling rate of different sediment types, and entrainment in prevailing currents, can result in a change in the structure and function of the feature

in finer scale topography, sediment quality and sediment composition. The degree of impact will vary according to the amount of fishing activity, the gear used and the sediment type. Sediments and faunal communities react differently to these pressures depending on grain size, the degree of sediment impaction and frequency or severity of the pressure upon them.

As detailed in section 8.4.2 of the bottom towed gear Impacts Evidence document[7], intensively fished areas may be maintained in a permanently altered state dominated by fauna that are adapted to frequent physical disturbance with the habitat unable to recover sufficiently before the next pass of gear, as few as three disturbances a year are sufficient to keep conditions in a transient biogeochemical state.

As per section 8.4 of the bottom towed gear Impacts Evidence document[7], 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.

One of the biotopes within the subtidal sand feature that are present or possibly present in the site had medium sensitivity to change in suspended solids or smothering and siltation pressures.

Given the very low levels of bottom towed gear activity in the site, the changes in the suspension of solids, smothering and siltation at the activity levels described will not result in an adverse effect on site integrity.

Circalittoral rock Subtidal and stony reef

As detailed in section 2.3 of the MMO Stage 2 MPA Fisheries Assessment[12], there is limited evidence on the impacts of bottom towed gear on hard bottom habitats. Despite harder substrate being more resilient than softer sediment, damage is still possible. Direct impact through abrasion causes damage and removal of habitats and species and indirect impacts of sediment loading via the creation of suspended material affects the feeding efficiency of filter feeders. As a result of fishing activity, habitats become homogenised and biodiversity and habitat complexity reduced. The level of impact depends on the type, design and intensity of fishing, the community structure and topographical variation. Steep, uneven, boulder reef for example, though unsuitable for most bottom towed gear, still experience damage if adjacent suitable fishing grounds or fishing by gear such as rock-hopper trawls. Environmental conditions such as water temperature, depth and topographic variation results in variable resistances with high topographical variation of habitats

[12] MMO Stage 2 MPA Fisheries Assessment, assets.publishing.service.gov.uk/media/65bb6d583e26be0011e47e23/Stage_2_MPA_Fisheries_Assessment.pdf (Last accessed 13 August 2024)

offering protection for species in crevices, and as such, patchier impact to gears. Recovery rates var by species, communities with high proportions of larger, long-lived, fragile, sessile epifauna being more vulnerable. Long lived fauna may take up to 8 years to recover following removal of impacts, whilst short lived fauna with lifespans of one to three years, may recover within 0.5 to three years. Evidence at Stage 2 of MMO's MPA fisheries assessments which considered bottom towed gear and 'Annex I reef: rocky' concluded that bottom towed gear is a significant risk to the condition of such habitats and their associated benthic communities.

Table 5 lists those biotopes which may be present in Shell Flat MPA. For circalittoral rock/subtidal stony reef, one biotope has medium sensitivity to abrasion, change in suspended solids and smothering. Four biotopes are medium to abrasion and penetration. Three are medium to abrasion and change in suspended solids and one biotope medium sensitivity to changes in suspended solids.

All pressures

Bottom towed fishing activity is relatively limited in Shell Flat MPA, and at the levels observed in the years analysed is unlikely to cause an adverse effect on site integrity. At the levels described, and SAR values observed, there is time for substantial recovery of the designated features between trawl passes.

However, fishing activity patterns may change due to a wider range of drivers, including changes in target species and/or changes in the spatial distribution of target species, or the discovery of novel stocks, in response to climate change and fisheries displacement, and competition with other activities and conservation measures for space. The first pass of a demersal trawl has proportionately more impact than subsequent passes (Hiddink *et al.*, 2006) so even relatively small increases bottom towed gear fishing may be of concern, particularly with biotopes present that have a medium sensitivity to pressures created by bottom towed gear, as listed in **Table 5**. The potential for increases in the levels of bottom towed fishing, and resulting abrasion, penetration, suspended solids and smothering and siltation pressures, and presence of more sensitive biotopes within the designated subtidal sediments, means that the risk of an adverse effect on site integrity as a result of an increase in activity levels cannot be excluded.

Considering the above, **MMO concludes that at the activity levels described, the use of bottom towed gear will not result in an adverse effect on site integrity for Shell Flat MPA. However, the potential for changes in bottom towed gear fishing levels, in combination with the presence of sensitive biotopes in the subtidal sediment and Annex I reef features, may result in an adverse effect on site integrity for Shell Flat MPA.**

4.3.3 Traps

The relevant pressures on the designated features of Shell Flat MPA from traps were identified in **Table 5** and are:

- abrasion or disturbance of the substrate on the surface of the seabed;
- removal of non-target species; and
- removal of target species (reef and rock only).

As noted, impacts from target and non-target removal pressures have been scoped out of this assessment, as they are assessed more completely within the abrasion and penetration pressures.

Subtidal sediments

Table 5 lists those biotopes which may be present in Shell Flat MPA. One of the biotopes for subtidal mud has a medium sensitivity to abrasion. For subtidal sand there are three with medium sensitivity to smothering, and one with medium sensitivity to abrasion, penetration and suspended solids.

As outlined in the Impacts Evidence documents, traps, and associated lines and anchors, may cause abrasion of subtidal sediments during setting and retrieval of gear, as well as from movement of set gear on the seabed as a result of storms, tides or currents. There is little primary evidence on the physical impact of traps on subtidal sediments, however the evidence that is available indicates that traps are not likely to be a concern unless used at particularly high levels of intensity, or if particularly sensitive species are present.

Section 4.2 describes the fishing activity within Shell Flat MPA and estimates that an annual combined average for both over and under 12 m vessels of approximately 1.61 tonnes were landed from within the MPA using traps (see **Table A1. 2** and **Table A1. 4**). Traps were scattered across the site and overlapping subtidal sand.

Circalittoral rock and subtidal stony reef

As per section 7.3 of the traps Impacts Evidence document[8], abrasion impacts from this gear type are unlikely to impact the rocky substrate itself but may impact associated taxa. Most of the literature before 2015 has suggested that traps are unlikely to significantly impact rocky reef biotopes. However, more recent studies suggest that traps will have negative impacts on the biological functions of reef habitats at increased spatial and temporal densities. Rees (2018) for example defined high potting as 30 pots and higher per 500 x 500 m. Although not directly comparable, the levels evident from fishing effort data for Shell Flat MPA from potting, at an annual average of 1.16 days, are well below the levels defined as high potting in Rees 2018. Studies show that upright and branching species that protrude from the reef (such as sponges or bryozoans) were found to be particularly

vulnerable to damage from the hauling of traps. The impact of abrasion or disturbance of the substrate on the surface of the seabed by traps is considered to be relatively low given the small footprint of gear, though the different sizes, materials and number of traps will mean the impact varies.

Table 5 lists those biotopes which may be present in Shell Flat MPA. For circalittoral rock/subtidal stony reef, one biotope has medium sensitivity to abrasion, change in suspended solids and smothering. Four biotopes are medium to abrasion and penetration. Three are medium to abrasion and change in suspended solids and one biotope medium sensitivity to just changes in suspended solids.

Section 4.2 describes the fishing activity within Shell Flat MPA and estimates that an annual combined average for both over and under 12 m vessels of 1.62 t were landed from within the MPA using traps.

Although MMO webmaps indicate that areas to be managed as reef, at the northeastern point of the site, overlaps fishing activity from traps, at the level of activity observed, risk of abrasion and disturbance is limited. Given the relatively low levels of trap activity within the site, together with the low scale of footprint for impacts from traps, it is considered that trap activity is unlikely to create heavy disturbance over an extensive range and hence the resilience of the community should be maintained at these activity levels.

With regards to the discussion above, the assessed activity levels and the evidence available for the impact of traps, **MMO concludes that at the activity levels described, the use of traps will not result in an adverse effect on site integrity for Shell Flat MPA.**

4.4 Part B conclusion

The assessment of anchored nets and lines, and traps on the subtidal sand and mud sub-features of the sandbanks which are slightly covered by seawater all the time designated feature in Shell Flat MPA, has concluded that at the activity levels described, the use of these gear types will not result in an adverse effect on the site integrity of the MPA. As such, MMO concludes that management measures to restrict fishing activities using anchored net and lines, and traps are not required in Shell Flat MPA.

The assessment of bottom towed gears on the subtidal sand and subtidal mud sub-features of the sandbanks which are slightly covered by seawater all the time designated feature in Shell Flat MPA, has concluded that these fishing activities may result in a significant risk of adverse effects on the site integrity of the MPA. As such MMO concludes that management measures are required to restrict bottom towed fishing gears from Shell Flat 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 way in which the activity could impact the site in-combination effects with those 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, with the same 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 Shell Flat 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 15 licences, within the 5 km buffer. An additional case was also highlighted by Natural England, Morgan and Morecambe Transmission Assets offshore wind project.

Table 6 show the activities and the relevant categories from the Joint Nature Conservation Committee (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
L/2019/00425	Wave: Operation and maintenance	New Forest District Council, coastal monitoring wave buoy network. Chain anchor weight of wave buoy makes contact with the seabed and can cause abrasion, particularly during severe weather conditions, however wave buoy is already in place. There are two wave buoys of concern for the MPA which are small scale and in position already. The licence is for servicing of the buoys by boat. **No in-combination effect possible.**
L/2014/00112/6	Power cable: Operation and maintenance	Walney OWF O and M licence, phase 2 export cable emergency repair, overlaps a small section of the northern corner of the MPA. **Possible in-combination effect.**
L/2018/00202	Power cable: Operation and maintenance	Walney 2 OWF, composite O and M licence overlaps a small section of the northern corner of the MPA. **Possible in-combination effect.**

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

[14] Detail 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: Marine case management system - Public register - MCMS (marinemanagement.org.uk) URL: marinelicensing.marinemanagement.org.uk/mmofox5/fox/live/MMO_PUBLIC_REGISTER

Marine licence case reference number[14]	PAD Category	Description
L/2015/00344	Dredge and spoil disposal	Disposal of maintenance dredge material, approx. 5 km north of the site. **No in-combination effect possible.**
L/2016/00166/1	Dredge and spoil disposal	Port of Barrow maintenance dredging disposal licence, approx. 7 km north of the site. **No in-combination effect possible.**
L/2017/00274	Telecommunication cable: Operation and maintenance	Isle of Man to UK interconnector cable maintenance and repair licence, only just overlaps the southern boundary of the MPA. **Possible in-combination effect.**
L/2017/00391/3	Dredge and spoil disposal	Devonshire dock quay, licence, approx. 7 km north of Shell Flat MPA. **No in-combination effect possible.**
L/2018/00362	Power cable: Operation and maintenance	West of Duddon Sands OFTO O and M licence, approx. 6 km north of Shell Flat MPA. **No in-combination effect possible.**
L/2019/00037	Dredge and spoil disposal	Walney extension pontoon/jetty dredge and diposal, approx. 7 km north of Shell Flat MPA. **No in-combination effect possible.**
L/2020/00050/1	Power cable: Operation and maintenance	Walney extension transmission assets O and M licence outside of the MPA, adjacent to the northern boundary of Shell Flat MPA. **No in-combination effect possible.**
L/2023/00185	Dredge and spoil disposal	Wyre beach and dune management scheme phases 1 and 2, on the coastline, approx. 4 km away. **No in-combination effect possible.**

Marine licence case reference number[14]	PAD Category	Description
L/2022/00512	Physical sampling	Little Bispham to Bispham and Gynn Square to Cocker Square Coast Protection Scheme Ground Investigations on the coastline, approx. 4 km away. **No in-combination effect possible.**
L/2014/00129/1	Navigation markers/lights	Navigation markers, small scale, on the coastline, approx. 4 km away, outside of Shell Flat MPA. **No in-combination effect possible.**
DCO/2022/00010	Power cable: Operation and maintenance	A joint DCO application has been submitted for the shared transmission assets between Morgan and Morecambe OWFs. The MPA is 5.71 km from the proposed work area for the transmission assets DCO. **No in-combination effect possible.**

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 6**).

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	**See Table 5**	**Anchored nets and lines**	**Traps**
Abrasion or disturbance of the substrate on the surface of the seabed	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 4 counts (0 counts for anchored nets and lines, and 4 counts for traps). For under 12 m vessels, between 2016 and 2020, the annual average fishing effort estimated to have been derived from the MPA via traps and anchored nets and lines was 3.37 (2.22 days for anchored nets and lines, and 1.16 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 17 days (11.09 for anchored nets and lines, and 5.78 for traps). The fishing effort data is further supported by the estimated live weight landings for under 12 m vessels (both UK and EU) that equal an annual average of

0.5 tonnes (0.11 tonnes for anchored nets and lines, and 0.393 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 pressure abrasion and disturbance of the substrate on the surface of the seabed. However, due to the annual average of anchored nets and lines and traps effort being low (3.37 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 an adverse effect on site integrity for Shell Flat 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 Shell Flat 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 Walney 2 OWF, licences (L/2014/00112/6, L/2018/00202) overlaps a small section of the northern corner of the MPA and the Isle of Man to UK interconnector cable maintenance and repair licence (L/2017/00274) only just overlaps the southern boundary of the MPA. Both licences will cause abrasion or disturbance of the seabed: Walney OWF in relation to cable repair, jetting and reburial and the use of jack up vessels, and Isle of Man to UK interconnector through reburial or rock protection over cabling. As detailed in section 3.3, 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 activities linked to Walney Extension OWF operation and maintenance (O and M) licence, 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, the licence interacts with 0.88 km of Shell Flat and Lune Bay MPA, and with a worst-case scenario of 1 km of cable repaired per year, the probability of a cable fault occurring within the MPA is 0.38 %. Also, the scale of overlap between the MPA and the licence is 0.83 % of the MPA Considering the limited frequency and scale of overlap of impact, it is unlikely there would be an adverse effect on site integrity. Particularly with low activity levels observed for anchored nets and lines and traps. 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.

It is also possible that activities linked to the Isle of Man to UK interconnector cable maintenance and repair licence, 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, due to the low level of spatial overlap between licensed activities and the MPA, it is only sediment deposition that would therefore impact Shell Flat MPA and not abrasion. Due to the relatively low deposition of 1.4mm and the expectation that this will be dispersed during one tidal cycle, being an area with high tidal strengths, it is unlikely there would be an adverse effect on site integrity. As there is no abrasion pressure, there is no impact pathway for in-combination effects.

Therefore, the MMO concludes that the combined pressures from anchored nets and lines and traps and other relevant activities will not result in an adverse effect on site integrity for Shell Flat MPA.

5.4 Part C conclusion

MMO concludes that fishing in-combination with other relevant activities will not result in an adverse effect on the site integrity for Shell Flat 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 gear, and traps, are capable of affecting (other than insignificantly) the designated features of Shell Flat MPA.

Part B of this assessment concluded that, at the activity levels described, use of bottom towed gear on the sedimentary features of Shell Flat 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 Shell Flat 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[4] document.

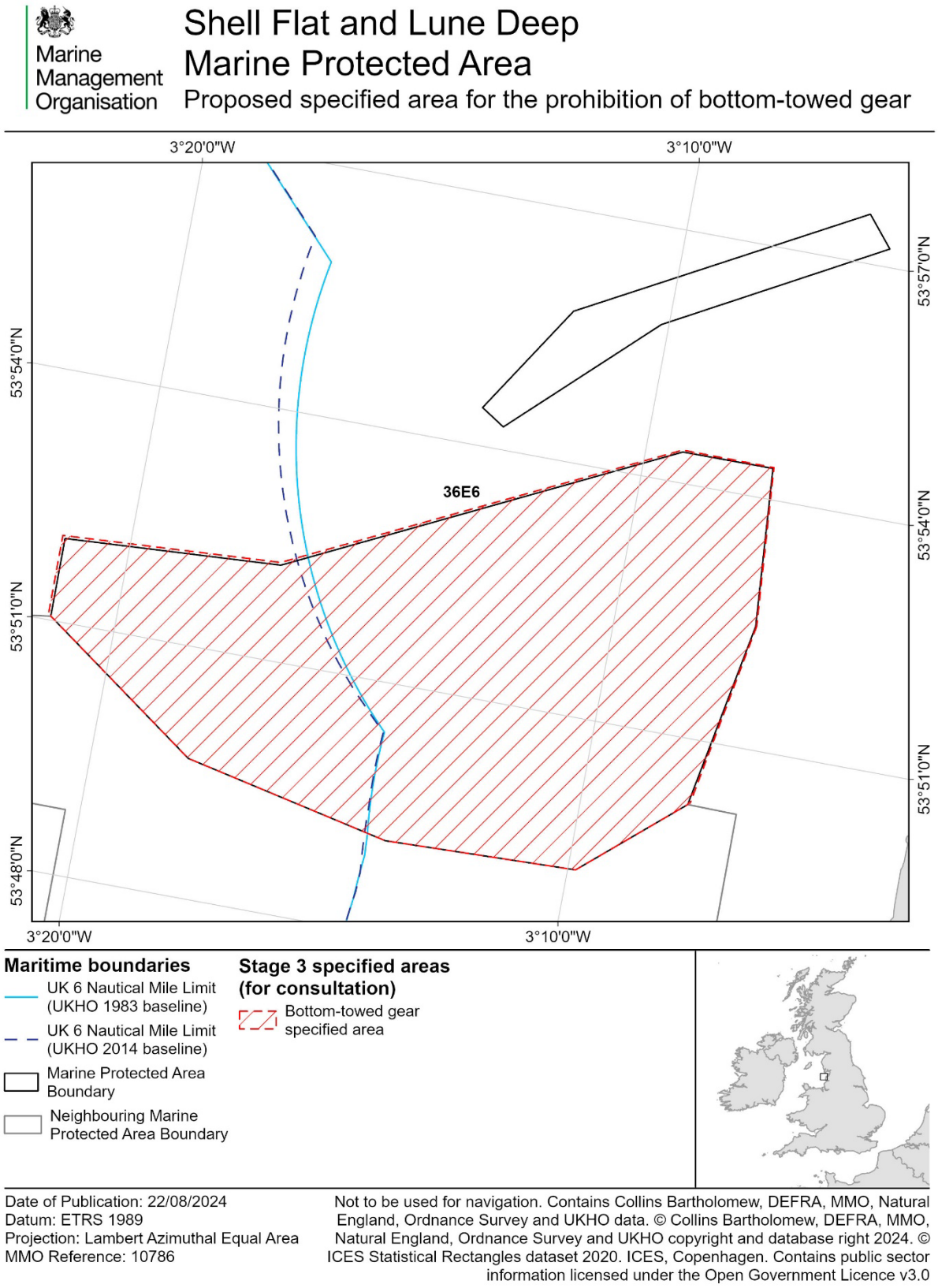

Figure 2: Map of proposed management.

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); and
- 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.

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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). All numbers are rounded to the nearest whole number.

			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
Demersal trawl	OTB	UK	3	100	5	100	5	100	6	100	1	100	0	0	20	100	3
	OTB Total		**3**	**100**	**5**	**100**	**5**	**100**	**6**	**100**	**1**	**100**	**0**	**0**	**20**	**100**	**3**
Demersal trawl Total			**3**	**38**	**5**	**71**	**5**	**63**	**6**	**55**	**1**	**25**	**0**	**0**	**20**	**44**	**3**
Traps	FPO	UK	5	100	2	100	3	100	5	100	3	100	7	100	25	100	4
	FPO Total		**5**	**100**	**2**	**100**	**3**	**100**	**5**	**100**	**3**	**100**	**7**	**100**	**25**	**100**	**4**
Traps Total			**5**	**63**	**2**	**29**	**3**	**38**	**5**	**45**	**3**	**75**	**7**	**100**	**25**	**56**	**4**
Grand Total			**8**	**0**	**7**	**0**	**8**	**0**	**11**	**0**	**4**	**0**	**7**	**0**	**45**	**0**	**7**

Table A1. 2: UK live weight landings tonnage (t) estimates by gear from vessels over 12 m in length in the MMO section of Shell Flat MPA (2016 to 2020).

Gear group	Gear code	2016	2017	2018	2019	2020	Total (2016 to 2020)	Average (2016 to 2020)
Demersal trawl	OTB	0.53	0.51	0.87	1.03	0.08	3.02	0.60
Demersal trawl Total		**0.53**	**0.51**	**0.87**	**1.03**	**0.08**	**3.02**	**0.60**
Traps	FPO	1.63	0.76	1.07	1.63	0.98	6.08	1.22
Traps Total		**1.63**	**0.76**	**1.07**	**1.63**	**0.98**	**6.08**	**1.22**
Grand Total		**2.16**	**1.27**	**1.94**	**2.66**	**1.06**	**9.10**	**1.82**

Table A1. 3: Percentage of each ICES rectangle intersected by the MMO section of Shell Flat MPA.

ICES rectangle	Percentage overlap (%)
36E6	0.81

Table A1. 4: UK live weight landings tonnage (t) estimates by gear from vessels under 12 m in length for the MMO section of Shell Flat MPA (2016 to 2020).

Gear group	Gear code	2016	2017	2018	2019	2020	Total (2016 to 2020)	Average (2016 to 2020)
Anchored Net/Line	GEN	<0.01	0	0	0	0	<0.01	<0.01
Anchored Net/Line	GN	0.09	0.21	0.07	0.07	0.04	0.48	0.10
Anchored Net/Line	GNS	0.01	0.01	<0.01	<0.01	0.02	0.04	0.01
Anchored Net/Line	GTR	0.01	<0.01	<0.01	0.01	<0.01	0.03	0.01
Anchored Net/Line	LL	0	0.01	0.01	<0.01	<0.01	0.02	<0.01
Anchored Net/Line Total		**0.11**	**0.23**	**0.09**	**0.08**	**0.06**	**0.57**	**0.11**
Demersal trawl	OT	0.05	0.04	0	0	0	0.09	0.02
Demersal trawl	OTB	0	0.02	0.02	0.02	0.03	0.09	0.02
Demersal trawl	OTT	0.24	0	0	0	0	0.24	0.05
Demersal trawl	TBB	0.02	0.01	0.01	<0.01	<0.01	0.05	0.01
Demersal trawl	TBN	0.09	0.08	0.06	0.01	<0.01	0.24	0.05
Demersal trawl Total		**0.41**	**0.15**	**0.10**	**0.03**	**0.04**	**0.71**	**0.14**
Dredge	DRB	0.04	0.05	<0.01	0.04	<0.01	0.14	0.03
Dredge Total		**0.04**	**0.05**	**0.00**	**0.04**	**0**	**0.14**	**0.03**
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	<0.01	0.01	<0.01	0	0.02	<0.01
Midwater Hook/Lines	LX	<0.01	<0.01	0.02	0.01	0.04	0.07	0.01
Midwater Hook/Lines Total		**<0.01**	**0.01**	**0.02**	**0.01**	**0.04**	**0.09**	**0.02**
Traps	FPO	<0.01	0.91	0.17	0.53	0.32	1.94	0.39
Traps Total		**<0.01**	**0.91**	**0.17**	**0.53**	**0.32**	**1.94**	**0.39**
Unknown	MIS	0.02	<0.01	0	0	0	0.02	<0.01

Gear group	Gear code	2016	2017	2018	2019	2020	Total (2016 to 2020)	Average (2016 to 2020)
Unknown Total		**0.02**	**<0.01**	**0**	**0**	**0**	**0.02**	**<0.01**
Grand Total		**0.58**	**1.34**	**0.38**	**0.69**	**0.46**	**3.46**	**0.69**

Table A1. 5: EU27 live weight landings tonnage (t) estimates by gear from vessels under 12 m in length for the MMO section of Shell Flat MPA (2016 to 2020).

Gear group	Gear code	2016	2017	2018	2019	2020	Total (2016 to 2020)	Average (2016 to 2020)
Dredge	DRB	0	0	0	0.01	0	0.01	<0.01
Dredge Total		**0**	**0**	**0**	**0.01**	**0**	**0.01**	**<0.01**
Traps	FPO	0	0	0	0.01	0	0.01	<0.01
Traps Total		**0**	**0**	**0**	**0**	**0**	**0.01**	**<0.01**
Grand Total		**0**	**0**	**0**	**0.02**	**0**	**0.02**	**<0.01**

Table A1. 6: Combined UK and EU27 live weight landings tonnage (t) estimates by gear from vessels under 12 m in length for the MMO section of Shell Flat MPA (2016 to 2020).

Gear group	Gear code	2016	2017	2018	2019	2020	Total (2016 to 2020)	Average (2016 to 2020)
Anchored Net/Line	GEN	<0.01	0	0	0	0	<0.01	<0.01
Anchored Net/Line	GN	0.09	0.21	0.07	0.07	0.04	0.48	0.10
Anchored Net/Line	GNS	0.01	0.01	<0.01	<0.01	0.02	0.04	0.01
Anchored Net/Line	GTR	0.01	<0.01	<0.01	0.01	<0.01	0.03	0.01
Anchored Net/Line	LL	0	0.01	0.01	<0.01	<0.01	0.02	<0.01
Anchored Net/Line Total		**0.11**	**0.23**	**0.09**	**0.08**	**0.06**	**0.57**	**0.11**
Demersal trawl	OT	0.05	0.04	0	0	0	0.09	0.02
Demersal trawl	OTB	0	0.02	0.02	0.02	0.03	0.09	0.02
Demersal trawl	OTT	0.24	0	0	0	0	0.24	0.05
Demersal trawl	TBB	0.02	0.01	0.01	<0.01	<0.01	0.05	0.01
Demersal trawl	TBN	0.09	0.08	0.06	0.01	<0.01	0.24	0.05
Demersal trawl Total		**0.41**	**0.15**	**0.10**	**0.03**	**0.04**	**0.71**	**0.14**
Dredge (UK)	DRB	0.04	0.05	<0.01	0.04	<0.01	0.14	0.03
Dredge (EU)	DRB	0	0	0	0.01	0	0.01	<0.01
Dredge Total		**0.04**	**0.05**	**0**	**0.05**	**0**	**0.14**	**0.03**
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	<0.01	<0.01	<0.01	0	0.02	<0.01
Midwater Hook/Lines	LX	<0.01	<0.01	0.02	0.01	0.04	0.07	0.01
Midwater Hook/Lines Total		**<0.01**	**0.01**	**0.02**	**0.01**	**0.04**	**0.09**	**0.02**
Traps (UK)	FPO	<0.01	0.91	0.17	0.53	0.32	1.94	0.39

Gear group	Gear code	2016	2017	2018	2019	2020	Total (2016 to 2020)	Average (2016 to 2020)
Traps (EU)	FPO	0	0	0	0.01	0.00	0.01	<0.01
Traps Total		**0.00**	**0.91**	**0.17**	**0.54**	**0.32**	**1.95**	**0.39**
Unknown	MIS	0.02	<0.01	0	0	0	0.02	<0.01
Unknown Total		**0.02**	**<0.01**	**0**	**0**	**0**	**0.02**	**<0.01**
Grand Total		**0.58**	**1.34**	**0.38**	**0.71**	**0.46**	**3.48**	**0.70**

Table A1. 7: Mean annual surface and subsurface SAR values for C-squares intersecting the MMO section of Shell Flat MPA (2016 to 2020).

Gear group	SAR category	2016	2017	2018	2019	2020
Demersal Trawls	Surface	0.03	0.09	0.10	0.07	0.04
	Subsurface	<0.01	0.01	0.01	0.01	<0.01
All Bottom Towed Gear	Surface	0.03	0.09	0.10	0.07	0.04
	Subsurface	<0.01	0.01	0.01	0.01	<0.01

Table A1. 8: Fishing effort (days) recorded by UK vessels under 12 m in length, separated by gear type for the area of Shell Flat MPA that intersects ICES rectangle 36EG (2016 to 2020). ICES rectangle level data has been apportioned to the MPA based on the percentage area of the ICES rectangle that intersects the MPA (see Table A1. 3).

ICES rectangle	Gear group	Fishing effort (days at sea)						
		2016	2017	2018	2019	2020	Total (2016 to 2020)	Annual average (2016 to 2020)
36E6	Demersal Trawl	1.77	1.64	2.11	1.22	0.79	7.55	1.51
	Dredges	0.06	0.17	0.01	0.06	0.01	0.31	0.06
	Bottom towed gear total	**1.84**	**1.81**	**2.12**	**1.28**	**0.80**	**7.86**	**1.57**
	Midwater Gill Drift	0.02	0	0	0	0	0.02	0.00
	Midwater Hooks/Lines	0	0.17	0.25	0.19	0	0.61	0.12
	Midwater gear total	**0.02**	**0.17**	**0.25**	**0.19**	**0**	**0.62**	**0.13**
	Anchored Nets and Lines	2.65	2.77	1.82	1.85	2.00	11.09	2.22
	Traps	0.05	1.56	1.23	1.88	1.06	5.78	1.16
	Static gear total	**2.70**	**4.33**	**3.05**	**3.73**	**3.06**	**16.87**	**3.37**
MPA total		**4.55**	**6.32**	**5.43**	**5.19**	**3.86**	**25.35**	**5.07**