Marine Management Organisation

MMO Stage 3 Site Assessment: Kentish Knock East MPA (Draft)






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Contents

Executive Summary

This assessment analyses the impact of anchored nets and lines, bottom towed gear and traps on the designated features subtidal coarse sediment, subtidal mixed sediment and subtidal sand in Kentish Knock East 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 the ongoing use of bottom towed gear at the activity level described poses a significant risk of hindering the achievement of the conservation objectives of Kentish Knock East MPA. Management measures will therefore be implemented for bottom towed gear for Kentish Knock East MPA.

1 Introduction

This assessment considers whether fishing activities are compatible with the conservation objectives of Kentish Knock East 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, Marine Management Organisation (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 force.

2 Site information

2.1 Overview

Natural England and Joint Nature Conservation Committee (JNCC) conservation advice packages and Department for Environment Food and Rural Affairs (Defra) factsheet were used for background on site geography, designations, features and conservation objectives:

- JNCC Site Information - Kentish Knocks East MCZ[1]
- Natural England and JNCC Conservation Advice - Kentish Knocks East MCZ[2]
- Defra Factsheet - Kentish Knocks East MCZ[3]

Kentish Knock East MPA is predominantly an inshore site located in the southern North Sea, lying across the 12 nautical miles (nm) territorial sea limit and covering an area of 96 square kilometres (km^2) (**Figure 1**).

Kentish Knock East was designated as a MCZ in 2019 and protects a variety of broad-scale sedimentary habitats supporting a range of animal species, including segmented worms and crustacean. It is located 35 km off the east coast of England within the outer Thames Estuary and extends over 96.4 km^2. The site ranges in depths from 19 m to 52 m and is primarily an inshore site with a small offshore section beyond the 12 nm limit. The area is predominantly subtidal mixed sediments with bands of subtidal coarse sediment and subtidal sands running in the deeper eastern areas of the site. The coarser and mixed sediments encourage anemones such as *Urticina felina* and bivalve mollusc species *Abra alba* to live within the sediment, while urchins and the brittlestar *Ophiura albida,* graze on the surface. The subtidal sand provides an important habitat for a variety of fish species such as the small spotted cat shark and commercially important flatfish species such as plaice *Pleuronectes platessa*.

[1] JNCC Site Information: jncc.gov.uk/our-work/kentish-knock-east-mpa/ (last accessed 10 May 2023)
[2] Natural England and JNCC Conservation Advice – Kentish Knock East MCZ: designatedsites.naturalengland.org.uk/Marine/MarineSiteDetail.aspx?SiteCode=UKMCZ0080 (last accessed 10 May 2023)
[3] Defra Fact Sheet – Kentish Knock East MCZ www.gov.uk/government/publications/marine-conservation-zones-kentish-knock-east (last accessed 10 May 2023)

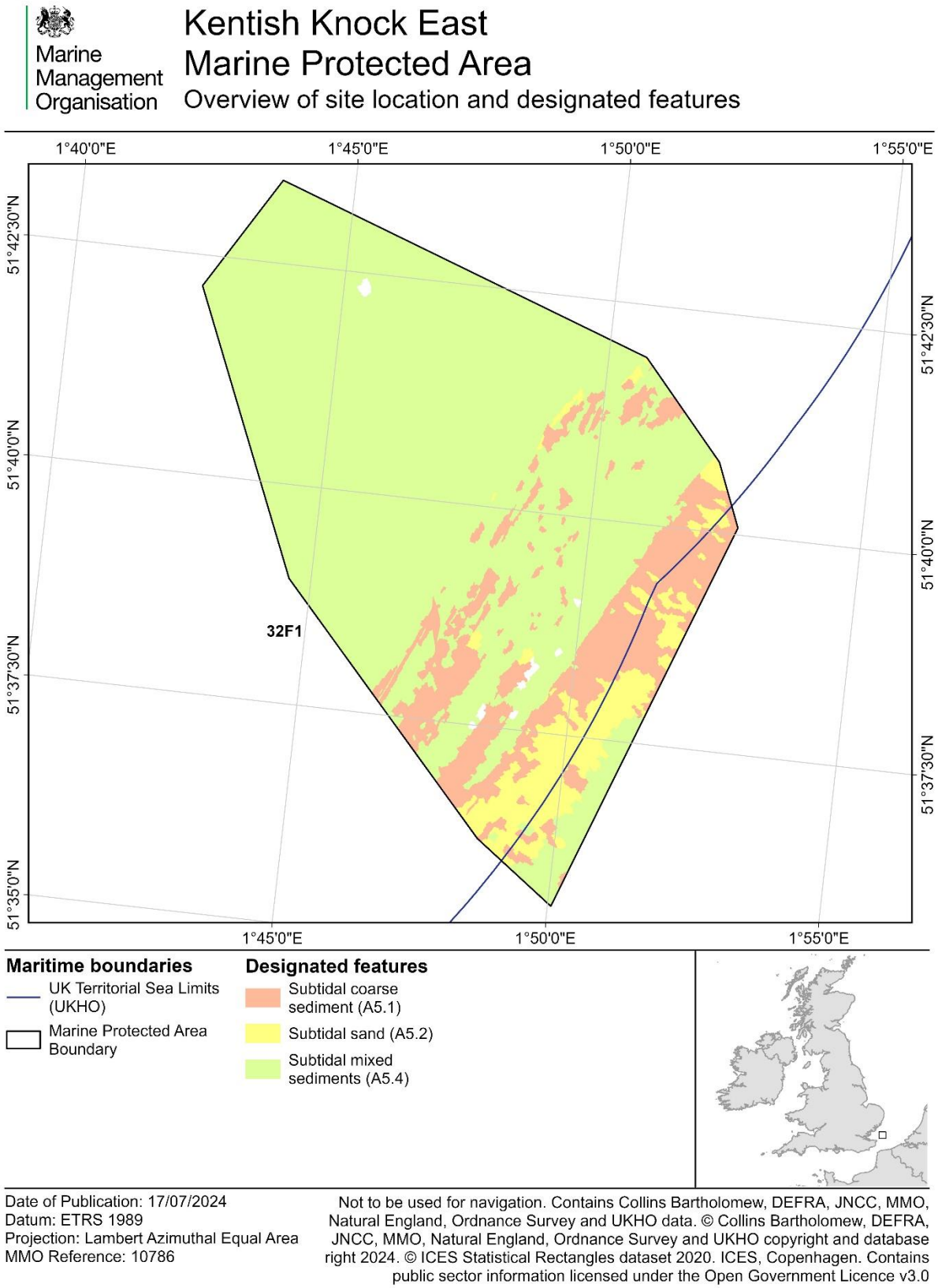

Figure 1: Site overview map.

The designated features and their general management approaches are set out below in **Table 1**.

Table 1: Designated features and general management approach (GMA).

Designated feature	General management approach
Subtidal coarse sediment	Recover to favourable condition
Subtidal mixed sediments	
Subtidal sand	Maintain in favourable condition

There is no feature condition assessment available for this site; in its absence Natural England conducted a vulnerability assessment, which includes sensitivity and exposure information for features and activities in a site. It is used as a proxy for a condition assessment to inform the GMA.

Biotope data for features within Kentish Knock East MPA is only available at the bioregion level for Southern North Sea. More information on this can be found in Natural England's supplementary advice on conservation objectives – Kentish Knock MCZ[2]. The general management approach for both subtidal coarse sediment and subtidal mixed sediments has been established as recover to favourable condition due to their moderate to high vulnerability to bottom towed fishing gear.

2.2 Scope of this assessment

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

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[4].

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. 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. 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 a marine protected area 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.

[4] For more information see www.legislation.gov.uk/ukpga/2009/23/section/126 (Last accessed: 25 July 2024)

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.

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 Stage 3 MPA Site Assessment Methodology document[5], which describes each type of fishing activity evidence and summarises the strengths and limitations of each source.

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

Gear type	Gear name	Gear code	Justification
Anchored nets and lines	Gillnets and entangling nets	GEN	These activities are present in VMS landings data, UK <12m landings data and Non-UK <12m landings data from ICES statistical rectangles overlapping the site
	Gill nets (not specified)	GN	
	Set gillnet (anchored)	GNS	
	Trammel net	GTR	
	Combined gillnet-trammel net	GTN	

[5] Stage3 MPA Site Assessment Methodology document: www.gov.uk/government/publications/stage-3-site-assessments (Last accessed: 25 July 2024)

Gear type	Gear name	Gear code	Justification
	Longline (unspecified)	LL	Activities present in UK <12m landings data from ICES statistical rectangles overlapping the site
	Longlines (demersal)	LLS	
Bottom towed gear	Towed dredge	DRB	Present in UK <12m landings data from ICES statistical rectangles overlapping the site
	Danish / anchor seine	SDN	Present in VMS landings data
	Pair seine	SPR	
	Beam trawl	TBB	These activities are present in VMS landings data, UK <12m landings data and Non-UK <12m landings data from ICES statistical rectangles overlapping the site
	Bottom pair trawl	PTB	
	Otter trawls (unspecified)	OT	
	Bottom otter trawl	OTB	
	Twin bottom otter trawl	OTT	
Midwater gear	Drift gillnet	GND	Activity is present in the UK <12m landings data from ICES statistical rectangles overlapping the site.
	Hook and line (unspecified)	LX	Activities present in UK <12m and Non-UK <12m landings data from ICES statistical rectangles overlapping the site
	Hand-operated pole-and-line	LHP	
	Midwater pair trawl	PTM	Activities are present in both VMS landings data and UK <12m landings data from ICES statistical rectangles overlapping the site
	Midwater otter trawl	OTM	
Traps	Pot/Creel	FPO	

Gear type	Gear name	Gear code	Justification
	Fyke net	FYK	These activities are present in VMS landings data, UK <12m landings data and Non-UK <12m landings data from ICES statistical rectangles overlapping the site
Misc	Miscellaneous	MIS	This activity is present in the UK < 12m landings data from ICES statistical rectangles overlapping the site

3.2 Pressures, features and activities screened out

This section identifies activities, features or pressures that are **occurring but do not need to be considered** for Kentish Knock East 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 Kentish Knock East 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 Kentish Knock East 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' has been declared as having been used to land fish from the 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.

- Stage 3 Fishing Gear MPA Impacts Evidence Anchored Nets and Lines[6];
- Stage 3 Fishing Gear MPA Impacts Evidence Bottom Towed Gear[7]; and
- 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, 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 Anchored Nets and Lines www.gov.uk/government/publications/stage-3-impacts-evidence (last accessed: 01 August 2024).
[7] Stage 3 Fishing Gear MPA Impacts Evidence Bottom Towed Gear: www.gov.uk/government/publications/stage-3-impacts-evidence (last accessed: 01 August 2024).
[8] Stage 3 Fishing Gear MPA Impacts Evidence Traps: www.gov.uk/government/publications/stage-3-impacts-evidence (last accessed: 01 August 2024).

Table 3: Sensitivity to potential pressures from fishing activities on designated features of Kentish Knock East MPA.

Potential pressures	Designated features								
	Subtidal coarse sediment			Subtidal mixed sediments			Subtidal sand		
	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 seabed type)									
Physical change (to another sediment type)									
Removal of non-target species									
Removal of target species									
Smothering and siltation rate changes									
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[4].

Table 3 shows the fishing activities and pressures identified in Part A which have been included for assessment in Part B. The important targets for favourable condition were identified within Natural England's conservation advice and supplementary advice tables. 'Important' in this context means only those targets relating to attributes that will most efficiently and directly help to define condition. These attributes should be clearly capable of identifying a change in condition.

Table 4 shows which targets were identified as important. The impacts of pressures on features were assessed against these targets to determine whether the activities causing the pressures are compatible with the site's conservation objectives.

Table 4: Relevant favourable condition targets for identified pressures.

Attribute	Target	Relevant Pressures
Distribution: presence and spatial distribution of biological communities	Recover the presence and spatial distribution of subtidal coarse and mixed sediments communities* Maintain the presence and spatial distribution of subtidal sand communities	• abrasion or disturbance of the substrate on the surface of the seabed • changes in suspended solids • 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.
Extent and distribution	Maintain the total extent and spatial distribution of subtidal coarse, subtidal mixed sediments and subtidal sand	
Structure and function: presence and abundance of key structural and influential species	Recover the abundance of listed species to enable them to be a viable component of the habitat*	
Structure: species composition of component communities	Recover the composition of component communities within subtidal coarse sediment and subtidal mixed sediments* Maintain the species composition of component communities within subtidal sand	
Structure: sediment composition and distribution	Maintain the distribution of sediment composition types across the feature	

* A recover target has been set as part of the GMA due to this feature's high sensitivity to pressures from bottom towed gear.

4.1 Fisheries access and existing management

Non-UK vessels can operate within Kentish Knock East MPA, provided that they have a licence issued by the UK to do so. Nationalities which fished within the MPA from 2016 to 2021 include vessels from the UK, Belgium, Germany, France, and the Netherlands. The majority of fishing taking place within the MPA from VMS records, are vessels from Belgium and the Netherlands.

No MPA specific fisheries management is currently in place within Kentish Knock East MPA.

More information on non-UK vessel access to UK waters can be found on MMO's Single Issuing Authority page[9].

4.2 Fishing activity level summary

Table A1. 1 to **Table A1. 8** in **Annex 1** display a detailed breakdown of fishing activity within Kentish Knock East MPA.

Demersal trawl fishing is the most frequent gear type occurring within Kentish Knock East MPA consisting of both bottom otter trawl and beam trawl with 147 and 150 VMS records respectively on average per year between 2016 and 2021. Vessels over 12 m in length using demersal trawls landed approximately 18 tonnes per year on average whereas vessels under 12 m in length landed approximately 3 tonnes per year on average. Swept area ratio (SAR) indicates that demersal trawl activity is relatively high for the period 2016 to 2020. Surface SAR values for C-squares intersecting Kentish Knock East MPA range between 0.92 and 2.13, and subsurface values between 0.5 and 0.86. A SAR value of 1 means that each area C-square experiences a pass of fishing gear on average once a year. The highest concentration of records from the VMS data occurs offshore of the 12 nm limit to the eastern edge of the site.

Landings data indicates the use of dredges within the site is occurring by under 12 m vessels, with an average of 4.46 tonnes over the 5-year period with a peak in 2018 of 12.84 tonnes landed. However, SAR values for dredging remain low ranging from 0.02 to 0.001 for both surface and subsurface.

VMS data indicates the use of anchored nets and lines from vessels over 12 m in length, are limited within the site with a total of 20 VMS counts recorded, 10 in 2016 and again in 2017. No counts were recorded in 2018, 2019, 2020 and 2021. Vessels under 12 m in length recorded 3.26 tonnes per year on average, accounting for approximately 18 % of all fishing activity for under 12 m vessels. Web maps and

[9] The UK Single Issuing Authority: www.gov.uk/guidance/united-kingdom-single-issuing-authority-uksia (Last accessed on: 26 July 2023).

VMS activity data indicate the use of anchored nets and lines occurs lightly throughout the centre of the MPA.

It has been identified by VMS records that traps are used within the MPA, in particular pots and creels by over 12 m vessels. Between 2016 and 2021 a total of 21 counts were recorded on average per year, occurring most frequently around the north-eastern and eastern edge of the MPA. Under 12 m vessels landings were an average total of 5.32 tonnes, approximately 29 % of the average total of landings in weight for that size class of vessel using both pots/creels and a very small amount of fyke net. Comparatively, over 12 m vessels landed an average of 2.55 tonnes over the 5-year period.

4.3 Pressures by gear type

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

As subtidal coarse sediments, mixed sediments 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 Kentish Knock East 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. We acknowledge that these pressures may require consideration as a result of any future evidence review, in conjunction with updated conservation advice from JNCC and Natural England.

Table 5 identifies all the biotopes that have a medium or high sensitivity to the corresponding pressures. It should be noted that the penetration and smothering pressures are only related to the interactions with bottom towed gear.

Biotope data for Kentish Knock East MPA is at the bioregion level of the Southern North Sea. Using best-available evidence there are no known records of these biotopes present within Kentish Knock East MPA at the current time. However, it must be acknowledged that lack of data does not equate to confirmed absence, and hence confidence in the absence of these biotopes must be regarded as low.

Table 5: Sediment biotopes in the Southern North Sea bioregion with at least medium sensitivity to relevant pressures.

Designated feature	Biotope	Pressure
Subtidal mixed sediments	*Sabella pavonina* with sponges and anemones on infralittoral mixed sediment (Perry, 2016a)	• Abrasion • Penetration • Smothering and siltation
	Ostrea edulis beds on shallow sublittoral muddy mixed sediment (Perry, Tyler-Walters and Garrard, 2023)	
	Sparse *Modiolus modiolus*, dense *Cerianthus lloydii* and burrowing holothurians on sheltered circalittoral stones and mixed sediment (Perry, 2016b)	
	Flustra foliacea and *Hydrallmania falcata* on tide-swept circalittoral mixed sediment (Readman, 2022)	• Penetration
Subtidal coarse sediment	*Hesionura elongata* and *Microphthalmus similis* with other interstitial polychaetes in infralittoral mobile coarse sand (Ashley and Marshall, 2022)	
Subtidal sand	*Echinocardium cordatum* and *Ensis* spp. in lower shore and shallow sublittoral slightly muddy fine sand (De-Bastos and Hill, 2016)	• Abrasion • Penetration

4.3.1 Anchored nets and lines

The relevant pressures and impacts on subtidal sediment features of Kentish Knock East MPA from anchored nets and lines were identified in **Table 3** and are:

- abrasion or disturbance of the substrate on the surface of the seabed.

Section 9.2 within the anchored nets and lines Impacts Evidence document[6] notes subtidal sediments are less sensitive and likely to recover more quickly from fishing activity impacts than more fragile habitats such as biogenic reefs, however fishing activity still has the potential to negatively impact these habitats and hinder the conservation objectives of the sites in which they are protected, particularly with regard to the structure and function of the biological communities present. Evidence suggests that impacts from anchored nets and lines are relatively low due to the small spatial footprint of the gear. Section 9.4.1 in the anchored nets and lines Impacts Evidence document[6] highlights the potential impacts of abrasion or disturbance of the substrate on the surface of the seabed to the features. It is noted

that impacts are more likely to occur during the hauling of gear or the movement of gear along the seabed due to strong tides, currents, or storm activity. Due to the static nature of the gear type, it is unlikely to affect the physical structure of the features but there is some potential for damage to the biological communities present in intensively fished areas.

Subtidal coarse and mixed sediments often contain populations of sessile epifauna which when disturbed or damaged are often slow to recover. By using Natural England's Advice on Operations[2], it has been identified that the Southern North Sea bioregion contains four relevant biotopes for the subtidal coarse sediment feature. The biotopes range from not sensitive to low sensitivity to the abrasion and disturbance pressure from anchored nets and lines. Comparatively, subtidal mixed sediments contain biotopes with medium sensitivities such as *Flustra foliacea* and *Hydrallmania falcata* on tide-swept circalittoral mixed sediment (Readman, 2022). Biotopes with medium sensitivity are assessed this way due to the fragile sessile erect nature of the characterising species and the potential for damage. The subtidal mixed sediments contain seven biotopes, two with high sensitivity, two with medium sensitivity and three with low sensitivity. Nonetheless both of the highly sensitive biotopes (*Ostrea edulis* beds on shallow sublittoral muddy mixed sediment (Perry, Tyler-Walters and Garrard, 2023) and Sparse *Modiolus modiolus*, dense *Cerianthus lloydii* and burrowing holothurians on sheltered circalittoral stones and mixed sediment (Perry, 2016b)) are unlikely to be found within the MPA due to the ecology and biology of the key stone species distinguishing these biotopes. *Ostrea edulis* occurs on shallow sublittoral sands in depths of up to 20 metres. The designated sand features of the site where this species may occur are in depths of over 30 metres. The sparse *Modiolus modiolus*, dense *Cerianthus lloydii* and burrowing holothurians on sheltered circalittoral stones and mixed sediment biotope is only known to occur in sheltered locations, predominantly Loches, with a very weak tidal stream, Kentish Knock East is an exposed site, 35 km offshore within the Southern North Sea.

Subtidal clean sand communities are likely to recover from disturbance more quickly than muddy sand habitats due to slower physical and biological recovery rates highlighting the complexities within the subtidal sand feature. Ten biotopes are identified within the Southern North Sea bioregion associated with the subtidal sand designated feature. Eight have low sensitivity to the abrasion/disturbance pressure, one is not sensitive, and one biotope has medium sensitivity. The most sensitive biotope (De-Bastos and Hill, 2016) contains two key species, *Echinocardium cordatum* and *Ensis ensis*, which are vulnerable to abrasion/disturbance of the seabed due to their fragility. However, comparing the Natural England site information[2] and The Marine Life Information Network[10], the preferred biological

[10] The Marine Life Information Network: www.marlin.ac.uk (last accessed on: 12 December 2023).

zone, depth range and tidal strength for these species make them highly unlikely to be present within the site.

Section 4.2 describes fishing activity within Kentish Knock East MPA and notes that the use of anchored nets and lines occurs across the site, and VMS activity data shows most of the fishing activity is taking place across all three feature types, predominantly in the south-eastern half of the site. However, the evidence presented suggests the static nature of anchored nets and lines would potentially only affect a small area of the seabed due to the small spatial footprint of the gear type and only at levels exceeding the pressure benchmark. Anchored nets and line activity within Kentish Knock East MPA in combination with the sensitivity of the biotopes present, is consistent with the condition targets and will not affect the distribution, extent or function of the biological communities present nor will it have the ability to affect the extent and distribution of the subtidal sediments and is consequently compatible with the conservation objectives of the MPA.

Therefore, MMO concludes that the ongoing use of anchored nets and lines at the activity levels described will not result in a significant risk of hindering the conservation objectives of the site.

4.3.2 Bottom towed gear

The relevant pressures and impacts on subtidal sediment features were identified in **Table 3** 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$^{\Delta;}$
- smothering and siltation rate changes*;
- changes in suspended solids (water clarity)*.

Pressures marked with matching superscript symbols ($^{\Delta}$ and *) have been consolidated in this assessment due to the similar nature of their impacts on the sediment features.

Section 8.4 in the bottom towed gear Impacts Evidence document[7] identifies and explains the potential impacts caused by penetration and abrasion, the change in water clarity and smothering and siltation rates and how these differ between the different bottom towed gears.

Bottom towed gear has the potential to negatively impact habitats and hinder the conservation objectives of the MPA especially in intensively fished areas. Abrasion and penetration pressures have both biological and physical impacts to sediment features. 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. Biological impacts from bottom towed gear include damage and

mortality to flora and fauna on the seabed via surface and subsurface abrasion and penetration.

The first pass of a trawl has the largest and most damaging initial impact on biomass and production of sediments, subsequent passes have smaller additional affects (Hiddink et al., 2006). This contributes to a shift in the biological community, removing the most sensitive species while allowing resilient organisms to remain (Hiddink et al., 2017), suggesting that infrequent trawling may be sufficient to maintain a community in an altered state.

Section 8.4.1 within the bottom towed gear Impacts Evidence document[7] discusses abrasion, penetration or disturbance of the substrate on the surface of the seabed and found communities within subtidal coarse sediment are considered to be particularly sensitive to bottom towed gear activity as these habitats contain large proportions of long lived and more sessile epifauna which are easily damaged by the pass of the trawl. Biotope data from the Southern North Sea bioregion indicates four biotopes within this feature, sensitivities ranging from not sensitive to medium sensitivity in relation to the abrasion/disturbance pressure. Presence of species such as *Hesionura elongate* are key reasons for the medium sensitivity, a common species associated with undisturbed coarse sediments.

Clean subtidal sands and ‘well sorted’ sediments generally have greater resilience and recovery from fishing disturbance and have a higher rate of recolonisation. However, as the mud fraction of sand increases it has been found that recovery time also increases. Sensitivities range from low to medium to the penetration/disturbance pressure. Medium sensitives are driven by the slow growing fragile fauna species such as *Fabulina fabula* (Tillin and Rayment, 2022) and *Echinocardium cordatum* (De-Bastos and Hill, 2016) which are defining species within two of the ten biotopes present in the Southern North Sea bioregion.

The subtidal mixed sediments feature contains seven biotopes within the Southern North Sea bioregion that could be present within Kentish Knock East MPA. The sensitivities to the penetration/disturbance pressure from bottom towed gear, range from low to highly sensitive. As discussed within **section 4.3.1** the highly sensitive biotopes (*Ostrea edulis* beds on shallow sublittoral muddy mixed sediment (Perry, Tyler-Walters and Garrard, 2023) and sparse *Modiolus modiolus*, dense *Cerianthus lloydii* and burrowing holothurians on sheltered circalittoral stones and mixed sediment (Perry, 2016b), are unlikely to be present within the site. However, subtidal mixed sediments are more susceptible to the surface and subsurface penetration due to the varied benthic communities present within this feature.

Section 8.4.2 in the bottom towed gear Impacts Evidence documents[7] summarises the impacts the gear type has on water quality. Bottom towed gear connects with the seabed causing the top layer of the sediment to mix with the surrounding water potentially changing the suspended solids in the ambient water and for that reason this activity effects the smothering and siltation rates and impacts the water clarity.

Changes in suspended sediment in the water column may have a range of biological effects on different species within the habitat, affecting fish health and clogging filtering organs of suspension feeding animals.

All biotopes associated with subtidal coarse sediment and subtidal sand found within the Southern North Sea bioregion have a sensitivity rating of not sensitive to low, to the smothering/siltation and water clarity (subtidal sand only) pressures. The species present within these biotopes are predominately infaunal species, capable of withstanding high levels of siltation and changes to water quality due to their biology and ecology. For example, *Arenicola marina,* is a key species in one of the low sensitivity biotopes (Tyler-Walters and Garrard, 2019), a burrowing polychaete that feeds by extracting food through the sediment.

Mixed sediments have a wide variety of species and biotopes associated with this feature and as such they are varying degrees of sensitivity to the smothering and water clarity pressure from not sensitive to highly sensitive. Good water clarity for filter feeding organisms that may be present in the MPA such as *Sabella pavonine* (Perry, 2016a), is important. Suspended solids in the water column will affect food availability and lead to greater energy expenditure resulting in the decline in benthic communities.

Kentish Knock East is a dynamic and high energy/exposed environment lying just beyond the 6 nm limit in the Outer Thames Estuary and is subjected to strong currents and high wave action, therefore communities are adaptable to fluctuating conditions. However, sediments and faunal communities will react differently to the pressure depending on grain size, the degree of sediment impaction and frequency/severity of the pressure upon them. For Kentish Knock East MPA, changes in suspended solids are applicable only to subtidal mixed sediments and subtidal sand.

As described in **section 4.2**, the fishing activity that occurs most frequently within Kentish Knock East MPA is demersal trawling, occurring throughout the site with higher levels of activity across the 12 nm limit, to the east of the site. To the east of the site is a mosaic of all three designated features, however this is the primary location of the subtidal sand feature within the site. The swept area ratio for Kentish Knock East MPA shows demersal trawls to have the highest ratio for both surface and subsurface SAR indicating high levels of activity that are not compatible with the distribution, structure, and function targets with regards to the biological communities present in this site.

Therefore, MMO concludes that there is a significant risk that the ongoing use of bottom towed gear at the activity levels described may hinder the achievement of the conservation objectives of the site.

4.3.3 Traps

The relevant pressures and impacts on subtidal sediment features were identified in **Table 3** and are:

- abrasion or disturbance of the substrate on the surface of the seabed.

Static gear types such as traps are not likely to significantly impact the physical structure of sediment features due to the small footprint of the gear, however evidence within section 9.2 of the traps Impacts Evidence documents[8] suggests that there can be a low impact on benthic communities. Abrasion/disturbance of the substrate on the surface of the seabed is one of the potential impacts from the use of traps. The interaction with the seabed and associated lines and anchors may impact the benthic communities if high levels of fishing activity take place in the area. This can cause abrasion and disturbance of the subtidal sediments during the setting and retrieval of the gear, as well as movement of the gear on the seabed from tides, currents, and storm activity.

Communities within subtidal coarse sediments are considered relatively robust and not sensitive to static gear. The four biotopes present in the Southern North Sea bioregion are either not sensitive or have a low sensitivity to the abrasion/disturbance pressure however there is the potential for damage to fragile epifauna with increased levels of potting and therefore increased anchors and lines and a larger spatial footprint.

Section 9.4.1 in the traps Impacts Evidence documents[8] collates evidence and finds that traps are unlikely to have an impact on subtidal mixed sediments except at heavy levels where the abrasion/penetration pressure becomes high. Biotopes within the Southern North Sea bioregion have a range of sensitivities to the abrasion/penetration pressure. Both *Ostrea edulis* beds on shallow sublittoral muddy mixed sediment (Perry, Tyler-Walters and Garrard, 2023) and Sparse *Modiolus modiolus*, dense *Cerianthus lloydii* and burrowing holothurians on sheltered circalittoral stones and mixed sediment (Perry, 2016b) are highly sensitivity to the pressure. However, sensitivity assessments have shown that these species have a low sensitivity to potting levels except at heavy levels and, as discussed in **section 4.3.1**, are unlikely to be present within the Kentish Knock East MPA.

The impacts of traps on subtidal sands are of limited concern due to the high energy environment where the feature occurs. Of the ten biotopes that may be present only one is of concern regarding abrasion/disturbance. If present, the biotope, *Echinocardium cordatum* and *Ensis* spp. in lower shore and shallow sublittoral slightly muddy fine sand (De-Bastos and Hill, 2016) has a medium sensitivity to the pressure and medium resilience suggesting only high levels of potting activity would affect the biological communities within the feature due to the key species burrowing nature.

Section 4.2 describes the fishing activity data within Kentish Knock East MPA and concludes that the use of traps is at a level not likely to cause an impact to the sediment features of the MPA. Due to the small spatial footprint of traps and the associated anchors and lines, the abrasion pressure is not likely to reach the pressure benchmark and cause detriment to the sediment features of the MPA. Traps will not affect the distribution of biological communities or alter the structure and function of key listed species and will not hinder the recover target set for these attributes.

Therefore, MMO concludes that the ongoing use of traps at the activity levels described will not result in a significant risk of hindering the conservation objectives of the site.

4.4 Part B conclusion

The assessment of anchored nets and lines, bottom towed gear and traps on subtidal coarse sediment, subtidal mixed sediments, and subtidal sand features of Kentish Knock East MPA has concluded that there is a significant risk that the ongoing use of bottom towed gears at the activity levels described will hinder the achievement of the conservation objectives of the MPA. As such, MMO will implement management measures for bottom towed gear to ensure there is no significant risk of hindering the conservation objectives of the 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 pose a significant risk of hindering the achievement of the conservation objectives; 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. 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 a significant risk of hindering the achievement of the site's conservation objectives 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.

There may be operational submarine cables within this MPA, these cables 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 operation and maintenance activity will be temporary with limited seabed impacts and is therefore unlikely to have significant in-combination effects with assessed fishing activity.

Bottom towed gears were identified in Part B as requiring management to avoid posing a significant risk of hindering the achievement of the site conservation objectives. Anchored nets and lines and traps are the only remaining fishing activities occurring within Kentish Knock East 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 eight projects, within the 5 km buffer applied. **Table 6** shows this activity and the relevant category from the JNCC Pressures-Activities Database (PAD)[11].

[11] JNCC Marine Pressures-Activities Database (PAD) v1.5 2022: https://hub.jncc.gov.uk/assets/97447f16-9f38-49ff-a3af-56d437fd1951 (last accessed: 31 July 2024)

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

Marine licence case reference number[12]	PAD Category	Description
MLA/2023/00222	Physical sampling	The Crown Estate will be undertaking vibrocore sampling to ground truth the interpretation of geophysical data sets and provide information on Key Resource Areas (KRA) for aggregates. The KRA crosses 2/3 of the MPA. The Marine Protected Area Considerations document accompanying the marine license application, clearly states the vibrocore samples will not be taken from within the Kentish Knock East MPA. **No direct or indirect pressure pathway for impact and therefore, no in-combination effects possible.**
MLA/2020/00185/1	Aggregate dredging	Marine aggregate extraction licence. Resources in the area consist of sand and gravels with the material dredged likely to be used as construction aggregates. The works activity is 3 km away from the site. **No direct or indirect pressure pathway for impact and therefore, no in-combination effects possible.**

[12] Detail on the marine licence activities can be viewed on the public register of marine licence applications: www.marinelicensing.marinemanagement.org.uk/mmofox5/fox/live/MMO_PUBLIC_REGISTER (last accessed 31 July 2024)

Marine licence case reference number[12]	PAD Category	Description
MLA/2023/00103	Aggregate dredging Physical sampling	Application to extract 15 million tonnes of aggregate over 15 years with a maximum annual tonnage of 1 million tonnes. Application withdrawn/refused. **No direct or indirect pressure pathway for impact and therefore, no in-combination effects possible.**
32945/050608/39	Construction of new works	London Array Offshore Wind Farm. The initial construction is comprised of 175 turbines located 11.9 km away from site. Further phases to install additional turbines, totalling 341 turbines, are planned with the construction area partially overlapping with the 5km buffer of Kentish Knock East MPA. **No direct or indirect pressure pathway for impact and therefore, no in-combination effects possible.**
MLA/2013/00298/2	Aggregate dredging Physical sampling	Marine Licence that will permit continued marine aggregate extraction. The works are between 1.4 km and 1.6 km away. **No direct or indirect pressure pathway for impact and therefore, no in-combination effects possible.**
MLA/2013/00296/3	Aggregate dredging Physical sampling	Marine Licence that will permit continued marine aggregate extraction. The works are between 1.4 km and 1.6 km away. **No direct or indirect pressure pathway for impact and therefore, no in-combination effects possible.**

Marine licence case reference number[12]	PAD Category	Description
MLA/2013/00297/5	Aggregate dredging Physical sampling	Marine Licence that will permit continued marine aggregate extraction. The works are between 1.4 km and 1.6 km away. **No direct or indirect pressure pathway for impact and therefore, no in-combination effects possible.**
North Falls Offshore Wind Farm (Project in **pre-application** stage EN010119 – reference for proposed application)	Offshore Wind: Construction; operation and maintenance Power Cable: Construction; laying, burial and protection; operation and maintenance	North Falls Offshore Wind Farm is a proposed project in the pre-application stage, this will be comprised of offshore wind turbines and associated infrastructure. The proposed North Falls Southern array area overlaps in part with the Eastern portion of Kentish Knock East MPA. Inside of the MPA site boundary. **Possible in-combination effects.**

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

Table 7 summarises the pressures exerted by fishing activities and identifies those exerted by all gears (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	**Offshore wind: construction; operation and maintenance**	**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 Fishing vs Fishing in-combination pressures

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.

5.1.1 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** anchored 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 24 vessels using anchored nets and lines or traps (3 vessels per year for anchored nets and lines, 21 vessels per year 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 30.75 days (8.75 days for traps, 22 days for anchored nets and lines, **Annex 1**, calculated from (**Table A1. 12**)). For the same period (2016-2020), the total fishing effort (under 12s) estimated to have been derived from the MPA were 184.45 days (52.48 days for traps, 131.97 days for anchored nets and lines (**Table A1. 12**)). The fishing effort data is further supported by the estimated live weight landings for under 12 m vessels that equal an annual average of 8.58 tonnes, 5.32 tonnes for traps and 3.26 tonnes for anchored nets and lines, between 2016 and 2020 (**section 4.2**).

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. The two designated features within the site that have a medium to high sensitivity to abrasion pressures are subtidal mixed sediments and subtidal sand. As described in **section 4.3**, static gear types are unlikely to have an impact on subtidal mixed sediments except at heavy levels, and the biotopes within these sediments with high sensitivities to abrasion pressures would be unlikely to be found within the MPA due to the depth and exposure of the site. VMS records for the over 12 m fleet show that the distribution of static gear use is fairly sparse within the MPA and concentrated around the northeastern boundary, leaving a large proportion of subtidal mixed sediments habitat free from activity. As activity levels are low and biotopes sensitive to abrasion are unlikely to be present, the risk of in-combination impact on subtidal mixed sediments is considered insignificant. Within the subtidal sand features there is only one biotope of concern, containing *Echinocardium cordatum* and *Ensis* spp. While the preferred biological zone depth of these species makes them unlikely to be present, were they to occur within the site, their burrowing nature provides resilience to all but high levels of trap effort. Due to the annual average of trap effort being low (8.75 days) the low scale of footprint for impacts from both these static gear types, and the low probability of impacting sensitive biotopes, any in-combination impact on subtidal sand features is considered insignificant.

Therefore, MMO concludes that the combined pressures from anchored nets and lines and traps will not result in a significant risk of hindering the chievement of the conservation objectives for the Kentish Knock East MPA at the current activity levels.

5.2 Fishing vs non-fishing activities in-combination pressures

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

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

The designated features of the Kentish Knock East MPA are sensitive to physical damage through surface abrasion and disturbance of the substrate from anchored

nets and line 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.

Activities associated with the proposed North Falls Offshore Wind Farm which might cause abrasion or disturbance of the seabed relate to offshore wind construction, operation, and maintenance. This project is proposed as an extension to the existing Greater Gabber Offshore Wind Farm, with two array areas. The Southern array area would overlap in part with Kentish Knock East MPA and is estimated to cover an area of 128.6 km^2. Construction including installation of infrastructure such as foundations and cables, may cause disturbance to the seabed through clearance of sand waves and boulders, burial of cables, presence of infrastructure and deposition of dredged material. Additional abrasion and disturbance of the seabed may also occur through the anchoring of vessels involved in installation and maintenance, through dragging and locking of the anchors and scour resulting from the chains.

As detailed in **section 4.3** pressures associated with anchored nets and lines and traps, at the current activity levels, are not considered to be causing a significant impact. It is possible that activities linked to the offshore wind farm construction, operation and maintenance, 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. As this project is in the pre-application stage the potential impacts, and any proposed mitigation methods to avoid hindering the conservation objectives, have not been fully explored. However, these works will be temporary, with offshore construction anticipated to begin in 2028 and operations commencing in 2030 and will only overlap with a minor portion of the MPA. The application for this project is expected to be submitted in 2024. Following formal consultation, marine licence applications submitted after August 2023 that could impact the site in-combination with the effects of assessed fishing activities will be included before finalising this assessment.

There are no other marine licences currently active within the MPA boundaries, therefore there is no pathway for in-combination effects for non-fishing activities and the assessed fishing activities.

Therefore, MMO concludes that the combined pressures from anchored nets and lines and traps and other relevant activities will not result in a significant risk of hindering the achievement of the conservation objectives for Kentish Knock East MPA.

5.3 Part C conclusion

MMO concludes that different fishing gear types in-combination will not result in a significant risk of hindering the achievement of the conservation objectives for Kentish Knock East MPA at the current activity levels described.

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, alone, are likely to have a significant effect on the designated features of Kentish Knock East MPA.

Part B of this assessment concluded that ongoing use of bottom towed gear on the sediment features of Kentish Knock East MPA may hinder the achievement of the conservation objectives of the MPA as a result of the impacts of abrasion or disturbance, penetration and smothering, siltation rate and suspended solid changes.

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 a significant risk of hindering the achievement of the conservation objectives of the MPA.

To ensure that fishing activities do not result in a significant risk of hindering the conservation objectives of the MPA, MMO will implement a byelaw to prohibit the use of bottom towed gear throughout Kentish Knock East 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[5] document.

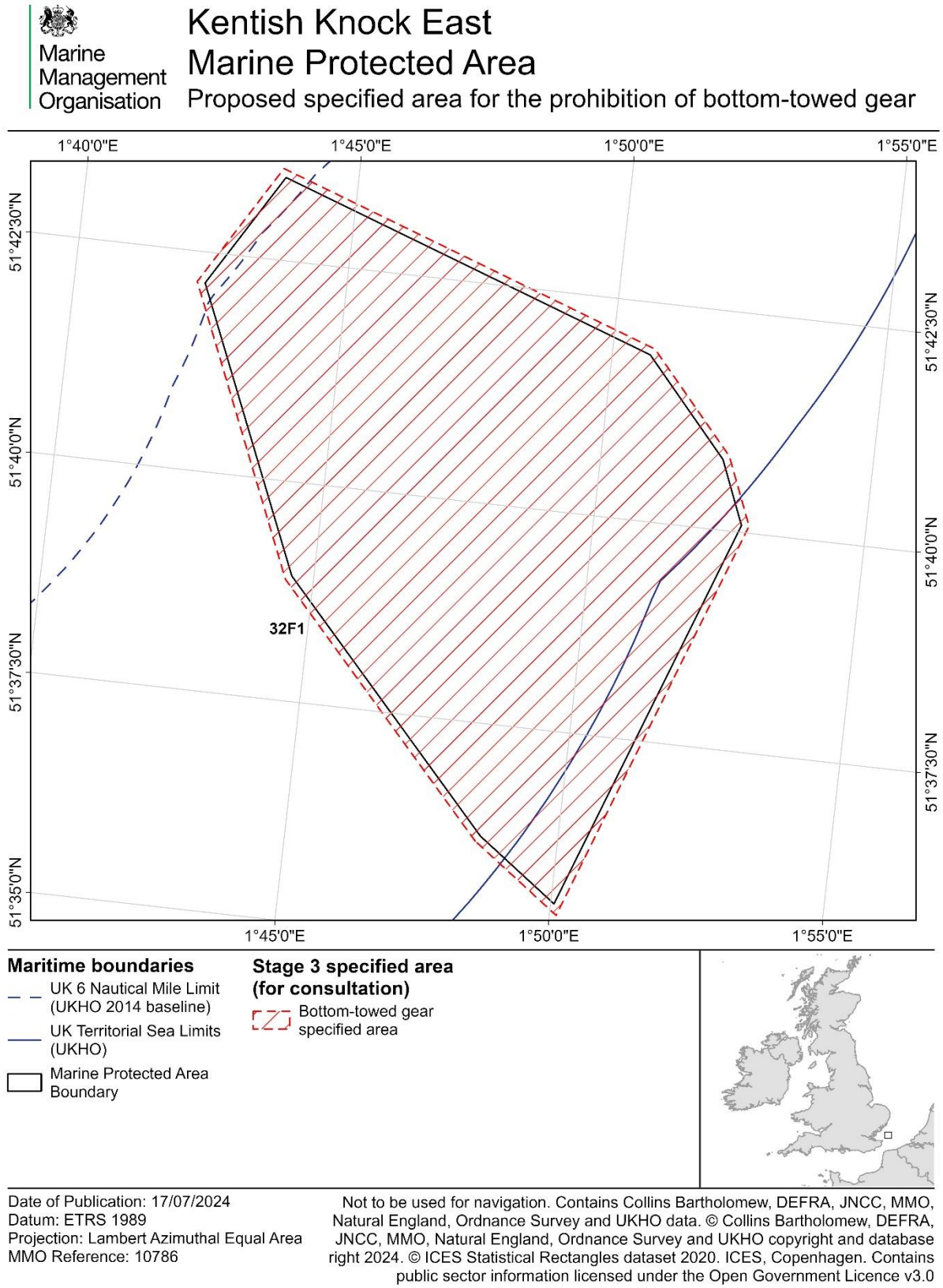

Figure 2: Map of proposed management.

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.

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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, gear group, and year (2016 to 2021), totals and annual average 2016 to 2021 for Kentish Knock East MPA. All numbers are rounded to the nearest whole number.

			2016		2017		2018		2019		2020		2021		Total (2016 to 2021)		Average (2016 to 2021)
Gear group	**Gear code**	**Nation group**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**
Anchored net/line	GTN	EU	10	100	10	100	0	0	0	0	0	0	0	0	20	100	3
	GTN total		**10**	**100**	**10**	**100**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**20**	**100**	**3**
Anchored net/line total			**10**	**2**	**10**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**20**	**1**	**3**
Demersal Seine	SDN	EU	0	0	0	0	6	100	0	0	2	100	1	100	9	100	2
	SDN total		**0**	**0**	**0**	**0**	**6**	**100**	**0**	**0**	**2**	**100**	**1**	**100**	**9**	**90**	**2**
	SPR	EU	1	100	0	0	0	0	0	0	0	0	0	0	1	100	0
	SPR total		**1**	**100**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**10**	**0**
Demersal seine total			**1**	**0**	**0**	**0**	**6**	**2**	**0**	**0**	**2**	**1**	**1**	**0**	**10**	**1**	**2**
Demersal trawl	OT	EU	0	0	0	0	0	0	0	0	0	0	4	100	4	100	1
	OT total		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**2**	**4**	**0**	**1**
	OTB	EU	272	99	206	99	186	100	78	100	8	100	127	100	877	99	146
		UK	4	1	2	1	0	0	0	0%	0	0	0	0	6	1	1
	OTB total		**276**	**55**	**208**	**73**	**186**	**60**	**78**	**42**	**8**	**3**	**127**	**69**	**883**	**49**	**147**
	TBB	EU	222	97	77	100	122	99	109	100	307	100	53	100	890	99	148
		UK	7	3	0	0	1	1	0	0	0	0	0	0	8	1	1

			2016		2017		2018		2019		2020		2021		Total (2016 to 2021)		Average (2016 to 2021)
Gear group	Gear code	Nation group	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	Count
	TBB total		**229**	**45**	**77**	**27**	**123**	**40**	**109**	**58**	**307**	**97**	**53**	**29**	**898**	**50**	**150**
Demersal trawl total			**505**	**97**	**285**	**92**	**309**	**91**	**187**	**99**	**315**	**99**	**184**	**69**	**1785**	**92**	**298**
Midwater Trawl	OTM	EU	0	0	1	100	0	0	0	0	0	0	3	100	4	100	1
	OTM total		**0**	**0**	**1**	**100**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**100**	**4**	**80**	**1**
	PTM	EU	0	0	0	0	1	100	0	0	0	0	0	0	1	100	0
	PTM total		**0**	**0**	**0**	**0**	**1**	**100**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**20**	**0**
Midwater trawl total			**0**	**0**	**1**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**3**	**1**	**5**	**0**	**1**
Traps	FPO	UK	7	100	14	100	23	100	1	100	1	100	79	100	125	100	21
	FPO total		**7**	**100**	**14**	**100**	**23**	**100**	**1**	**100**	**1**	**100**	**79**	**100**	**125**	**100**	**21**
Traps total			**7**	**1**	**14**	**5**	**23**	**7**	**1**	**1**	**1**	**0**	**79**	**30**	**125**	**6**	**21**
Grand total			**523**	**1**	**310**	**0**	**339**	**0**	**188**	**0**	**318**	**0**	**267**	**0**	**1945**	**0**	**325**

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

Gear group	Gear code	2016	2017	2018	2019	2020	Total (2016 to 2020)	Annual average (2016 to 2020)
Demersal trawl	OT	0	0	0	0	0	0	0
Demersal trawl	OTB	0.10	0.42	0	0	0	0.52	0.10
Demersal trawl	TBB	1.14	0	0.21	0	0	1.35	0.27
Demersal trawl total		**1.24**	**0.42**	**0.21**	**0**	**0**	**1.87**	**0.37**
Traps	FPO	1.34	3.60	6.69	0.10	0.99	12.73	2.55
Traps total		**1.34**	**3.60**	**6.69**	**0.10**	**0.99**	**12.73**	**2.55**
Grand total		**2.58**	**4.02**	**6.9**	**0.1**	**0.99**	**14.59**	**2.92**

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

Gear group	Gear code	2016	2017	2018	2019	2020	Total (2016 to 2020)	Average (2016 to 2020)
Demersal seine	SDN	0	0	0.17	0	0.17	0.34	0.07
Demersal seine total		**0**	**0**	**0.17**	**0**	**0.17**	**0.34**	**0.07**
Demersal trawl	OTB	9.96	6.33	12.15	6.89	0.91	36.23	7.25
	TBB	14.36	6.0	8.55	8.09	16.14	53.14	10.63
Demersal trawl total		**24.32**	**12.32**	**20.70**	**14.97**	**17.05**	**89.36**	**17.87**
Midwater trawl	OTM	0	7.52	0	0	0	7.52	1.50
Midwater trawl total		**0**	**7.52**	**0**	**0**	**0**	**7.52**	**1.50**
Grand total		**24.32**	**19.84**	**20.87**	**14.97**	**17.22**	**97.22**	**19.44**

Table A1. 4: Percentage overlap between ICES rectangles and Kentish Knock East MPA.

ICES rectangle	Percentage overlap (%)
32F1	2.8

Table A1. 5: UK under 12 m live weight tonnage (t) estimates by gear for Kentish Knock East MPA.

Gear group	Gear code	2016	2017	2018	2019	2020	Total (2016 to 2020)	Average (2016 to 2020)
Anchored net/line	GEN	0.11	0.04	0	0	0	0.15	0.03
	GN	1.05	2.08	1.01	1.16	1.13	6.44	1.29
	GNS	0.19	0.23	1.08	1.14	2.06	4.70	0.94
	GTR	1.26	0.63	0.60	0.22	0.60	3.31	0.66
	LL	0.25	0.43	0.14	0.26	0.39	1.46	0.29
	LLS	0	0.02	0.19	0.02	0	0.22	0.04
Anchored net/line total		**2.86**	**3.43**	**3.01**	**2.80**	**4.18**	**16.28**	**3.26**
Demersal trawl	OT	0.78	0.28	0	0	0	1.06	0.21
	OTB	0.18	2.75	3.32	3.07	3.09	12.41	2.48
	OTT	1.60	0.54	0	0	0	2.14	0.43
	TBB	0.01	0.02	0.02	0	0	0.05	0.01
Demersal trawl total		**2.57**	**3.60**	**3.33**	**3.07**	**3.09**	**15.66**	**3.13**
Dredge	DRB	0.03	0.40	12.84	8.69	0.35	22.30	4.46
Dredge total		**0.03**	**0.40**	**12.84**	**8.69**	**0.35**	**22.30**	**4.46**
Midwater gill drift	GND	0.39	0.41	2.26	1.49	0.32	4.87	0.97
Midwater gill drift total		**0.39**	**0.41**	**2.26**	**1.49**	**0.32**	**4.87**	**0.97**
Midwater hook/lines	LHP	0.05	0.05	0.13	0.41	0.04	0.67	0.13
	LX	0	0	0	0.02	0.01	0.03	0.01
Midwater hook/lines total		**0.05**	**0.05**	**0.13**	**0.42**	**0.05**	**0.70**	**0.14**
Midwater trawl	OTM	0	0	0.76	3.64	0.05	4.46	0.89
	PTM	0	0	0	0	0	0	0
Midwater trawl total		**0**	**0**	**0.77**	**3.64**	**0.05**	**4.46**	**0.89**
Traps	FPO	5.08	10.58	3.69	1.12	5.35	25.81	5.16
Traps total		**5.08**	**10.58**	**3.69**	**1.12**	**5.35**	**25.81**	**5.16**
Unknown	MIS	0	0	0	0	0.38	0.38	0.08
Unknown total		**0**	**0**	**0**	**0**	**0.38**	**0.38**	**0.08**
Grand total		**10.96**	**18.48**	**26.03**	**21.24**	**13.77**	**90.48**	**18.10**

Table A1. 6: EU27 under 12 m live weight tonnage (t) estimates by MA and gear in Kentish Knock East MPA.

Gear group	Gear code	2016	2017	2018	2019	2020	Total (2016 to 2020)	Average (2016 to 2020)
Anchored net/line	GTR	0	0	0	0	0	0	0
Anchored net/line total		**0**	**0**	**0**	**0**	**0**	**0**	**0**
Demersal trawl	OTB	0	0	0	0	0	0	0
	OTT	0	0	0.01	0	0	0.01	0
Demersal trawl total		**0**	**0**	**0.01**	**0**	**0**	**0.01**	**0**
Midwater hook/line	LHP	0	0	0	0	0	0	0
Midwater hook/line total		**0**	**0**	**0**	**0**	**0**	**0**	**0**
Traps	FPO	0	0	0	0	0.80	0.80	0.16
	FYK	0	0	0	0	0	0	0
Traps total		**0**	**0**	**0**	**0**	**0.80**	**0.80**	**0.16**
Grand total		**0**	**0**	**0.01**	**0**	**0.80**	**0.81**	**0.16**

Table A1. 7: Mean annual surface and subsurface SAR values for Kentish Knock East MPA.

Gear group	SAR category	2016	2017	2018	2019	2020
Demersal seines	**Surface**	0.04	0	0.01	0	0.03
	Subsurface	0	0	0	0	0
Demersal trawls	**Surface**	2.13	1.24	1.67	1.04	0.92
	Subsurface	0.86	0.50	0.83	0.61	0.82
Dredges	**Surface**	0.01	0	0	0	0
	Subsurface	0.01	0	0	0	0

Table A1. 8: Fishing effort (days) recorded by UK vessels under 12m in length, separated by gear type for the area of Kentish Knock East MPA that intersects the marine portion of ICES rectangle 32F1 (2016 to 2021). 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. 6).

Gear group	Fishing effort (days at sea)							
	2016	2017	2018	2019	2020	2021	Total (2016 to 2021)	Annual average (2016 to 2021)
Demersal trawl	20.57	22.18	15.64	16.88	14.89	11.87	102.02	17.00
Dredge	0.07	0.21	1.16	0.81	0.17	0.06	2.47	0.41
Bottom towed gear total	**20.64**	**22.39**	**16.80**	**17.69**	**15.06**	**11.92**	**104.49**	**17.42**
Midwater gill drift	5.81	4.56	5.79	5.21	4.20	2.44	28.00	4.67
Midwater trawl	0	0.03	0.40	1.74	0.17	0.03	2.36	0.39
Midwater hooks and lines	0.34	1.03	1.03	2.50	0.62	0.20	5.72	0.95
Midwater gear total	**6.15**	**5.62**	**7.21**	**9.44**	**4.99**	**2.67**	**36.08**	**6.01**
Traps	8.27	15.48	8.18	5.72	6.56	8.28	52.48	8.75
Anchored nets and lines	19.17	22.03	19.96	20.33	26.69	23.78	131.97	22.00
Static gear total	**27.44**	**37.51**	**28.14**	**26.05**	**33.25**	**32.06**	**184.45**	**30.74**
Unknown	0	0	0	0	0.21	0.42	0.64	0.11
Unknown total	**0**	**0**	**0**	**0**	**0.21**	**0.42**	**0.64**	**0.11**
MPA total	**54.22**	**65.52**	**52.15**	**53.18**	**53.51**	**47.08**	**325.66**	**54.28**