Department for Energy Security & Net Zero

Offshore Oil & Gas Licensing

33rd Seaward Round

Marine Conservation Zone/Marine Protected Area Assessment

July 2023

Contents

1 Introduction

1.1 Background and overview of plan

The plan/programme covering this (and potential future) seaward licensing rounds has been subject to a Strategic Environmental Assessment (OESEA4), completed in September 2022. The SEA Environmental Report includes detailed consideration of the status of the natural environment and potential effects of the range of activities which could follow licensing, including potential effects on conservation sites. Public consultation on OESEA4 concluded on 27th May 2022 and the Government Response was published on 22nd September 2022, which summarised the comments received and provided further clarifications, at which time, the plan/programme was also adopted. The North Sea Transition Authority (NSTA) subsequently decided to offer 931 Blocks or part-Blocks for licensing as part of a 33rd Seaward Licensing Round covering areas of the UK Continental Shelf (UKCS), and applications were received for licences covering 258 Blocks or part-Blocks.

1.2 Licensing

The exclusive rights to search and bore for petroleum in Great Britain, the territorial sea adjacent to the United Kingdom and on the UK Continental Shelf (UKCS) are vested in the Crown and the *Petroleum Act 1998* gives the NSTA the power to grant licences to explore for and exploit these resources. The main type of offshore Licence is the Seaward Production Licence. Offshore licensing for oil and gas exploration and production commenced in 1964 and progressed through a series of Seaward Licensing Rounds. A Seaward Production Licence grants exclusive rights to the holders "to search and bore for, and get, petroleum" in the area covered by the Licence but does not constitute any form of approval for activities to take place in the Blocks, nor does it confer any exemption from other legal or regulatory requirements. Offshore activities are subject to a range of statutory permitting and consenting requirements.

1.3 Document purpose

The Marine and Coastal Access Act 2009 (as amended) (MCAA) and the *Marine (Scotland) Act 2010* (as amended) (M(S)A) contain general duties for public authorities (in this case the Department for Energy Security and Net Zero, hereafter, the Department[1]) in relation to the protection of Marine Conservation Zones (MCZ) and Marine Protected Areas (MPA)[2] respectively. Sections 125 and 82 respectively of the above Acts apply to public authorities

[1] Note that while the NSTA grant licences, the Department retains environmental regulatory functions which are administered by the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED). These include, in particular, functions under *The Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001*, including the giving of agreement (on behalf of the Secretary of State) to the grant by the NSTA of seaward oil and gas licences. This assessment therefore proceeds on the basis that the Department is a public authority that should consider the potential for effects on MPAs and MCZs under section 125 of the *Marine and Coastal Access Act 2009* and section 82 of the *Marine (Scotland) Act 2010*.

[2] In Scottish waters, this includes MPAs created for nature conservation, demonstration and research, or to protect historic assets.

which have any function, the exercise of which is capable of affecting (other than insignificantly):

- the protected features of an MCZ/MPA;

- any ecological or geomorphological process on which the conservation of any protected feature of an MCZ/MPA is (wholly or in part) dependent.

Where it is considered that the exercise of a function would or might significantly hinder the achievement of the conservation objectives for an MCZ or MPA, the public authority must inform the appropriate statutory conservation bodies, which in Scotland also includes, where appropriate, Historic Environment Scotland[3] and the Scottish Ministers. This assessment has been undertaken by the Department to ascertain whether its function in agreeing to the licensing of blocks for oil and gas exploration is capable of affecting any MCZ or MPA, and if so, whether the effect would be significant, and whether this would hinder the achievement of site conservation objectives.

[3] All current historic MPAs in Scottish waters are located entirely within territorial waters.

2 Blocks applied for, potential activities and relevant sites

2.1 Blocks applied for

The Blocks applied for in the 33rd Round are shown on Figure 2.1 to Figure 2.3 and are listed in Appendix B; in total, 258 Blocks were applied for.

2.2 Nature and likely scale of activity

On past experience the activity that actually takes place is less than what is included in the work programme at the licence application stage. A proportion of Blocks awarded may be relinquished without any offshore activities occurring. Activity after the Initial Term is much harder to predict, as this depends on the results of the initial phase, which is, by definition, exploratory. Typically, less than half the wells drilled reveal hydrocarbons, and of that, less than half will have a potential to progress to development. For example, the OGA analysis of exploration well outcomes from the Moray Firth & Central North Sea between 2003 and 2013 indicated an overall technical success rate of 40% with respect to 150 exploration wells and side-tracks (Mathieu 2015). Depending on the expected size of finds, there may be further drilling to appraise the hydrocarbons (appraisal wells).

Discoveries that progress to development may require further drilling, installation of infrastructure such as wellheads, pipelines and possibly fixed platform production facilities, although recent developments are mostly tiebacks to existing production facilities rather than stand-alone developments. For example, out of 21 projects identified on the NSTA's Energy Pathfinder (as of 2nd February 2023)[4], 12 are planned as subsea tie-backs, 3 involve new stand-alone production platforms and 5 are likely to be developed via Floating Production, Storage and Offloading (FPSO) facilities. The final form of development for many of the projects is not decided, with some undergoing re-evaluation of development options but some are likely to be subsea tie-backs. The nature and scale of potential environmental impacts from the drilling of development wells are similar to those of exploration and appraisal wells and thus the screening criteria described in Section 4 are applicable to the potential effects of development well drilling within any of the 33rd Round Blocks.

Completion of the exploration/appraisal work programmes is likely to involve one or more of the activities summarised in Table 2.1. A series of assumptions has been developed on the nature and scale of activities to be assessed which have been informed by an evidence base for potential effects in OESEA4 (BEIS 2022a) and the recent HRA for the 33rd licensing round (BEIS 2022b). While this assessment considers potential activities which may follow licensing, the licence only grants exclusive rights to the holders "to search and bore for, and get, petroleum", and does not constitute any form of approval for activities to take place in the licence Blocks, nor does it confer any exemption from other legal or regulatory requirements. Offshore activities are subject to a range of statutory permitting and consenting requirements, and activities will be subject to further assessment as part of any consenting process.

[4] https://www.nstauthority.co.uk/supply-chain/energy-pathfinder/

Table 2.1: Indicative overview of potential activities that could arise during the initial term

Potential activity	Description	Assumptions used for assessment
Geophysical survey		
Seismic (2D and 3D) survey	2D seismic involves a survey vessel with an airgun array and a towed hydrophone streamer (up to 12 km long), containing several hydrophones along its length. The reflections from the subsurface strata provide an image in two dimensions (horizontal and vertical). Repeated parallel lines are typically run at intervals of several kilometres (minimum *ca*. 0.5km) and a second set of lines at right angles to the first to form a grid pattern. This allows imaging and interpretation of geological structures and identification of potential hydrocarbon reservoirs. 3D seismic survey is similar but uses several hydrophone streamers towed by the survey vessel. Thus closely spaced 2D lines (typically between 25 and 75m apart) can be achieved by a single sail line.	These deep-geological surveys tend to cover large areas (300-3,000km^2) and may take from several days up to several weeks to complete. Typically, large airgun arrays are employed with 12-48 airguns and a total array volume of 3,000-8,000 in^3. From available information across the UKCS, arrays used on 2D and 3D seismic surveys produce most energy at frequencies below 200Hz, typically peaking at 100Hz, and with a peak broadband source level of around 256dB re 1µPa @ 1m (Stone 2015). While higher frequency noise will also be produced which is considerably higher than background levels, these elements will rapidly attenuate with distance from source; it is the components <1,000Hz which propagate most widely.
Rig site survey	Rig site surveys are undertaken to identify seabed and subsurface hazards to drilling, such as wrecks and the presence of shallow gas. The surveys use a range of techniques, including multibeam and side scan sonar, sub-bottom profiler, magnetometer and high-resolution seismic involving a much smaller source (mini-gun or four airgun cluster of 160 in^3) and a much shorter hydrophone streamer. Arrays used on site surveys and some Vertical Seismic Profiling (VSP) operations (see below) typically produce frequencies predominantly up to around 250Hz, with a peak source level of around 235dB re 1µPa @ 1m (Stone 2015). Studies (Crocker & Fratantonio 2016, Halvorsen & Heaney 2018 (also see Labak 2019), Pace *et al.* 2021) have sought to understand the acoustic characteristics of example geophysical survey equipment types including through open water testing, which has provided a better understanding of the source levels, frequencies, and potential effects of using this equipment.	A rig site survey typically covers 2-3km^2. The rig site survey vessel may also be used to characterise seabed habitats, biota and background contamination. Survey durations are usually of the order of four or five days.
Drilling and well evaluation		
Rig tow out & de-mobilisation	Mobile rigs are towed to and from the well site typically by 2-3 anchor handling vessels.	The physical presence of a rig and related tugs during tow in/out is both short (a number of days depending on initial location of rig) and transient.
Rig placement/ anchoring	Semi-submersible rigs are used in deeper waters (normally >120m). Mooring is achieved using either anchors (deployed and recovered by anchor handler vessels) or dynamic positioning (DP) to	Semi-submersible rig anchors (if used) may extend out to a radius of 1.5-1.8km in North Sea waters of the UK. An ES for an exploration well in Block 18/05 in *ca*. 90m water depth estimated

Potential activity	Description	Assumptions used for assessment
	manoeuvre into and stay in position over the well location. Eight to 12 anchors attached to the rig by cable or chain are deployed radially from the rig; part of the anchoring hold is provided by a proportion of the cables or chains lying on the seabed (catenary).	that the area of seabed affected by anchoring was *ca*. 0.01km^2 (Apache North Sea Limited 2006), and in deeper waters the seabed footprint may be in the order of 0.04km^2-0.09km^2 (Premier Oil 2016).
	Jack-up rigs are used in shallower waters (normally <120m) and jacking the rig legs to the seabed supports the drilling deck. Each of the rig legs terminates in a spud-can (base plate) to prevent excessive sinking into the seabed. Unlike semi-submersible rigs, jack-up rigs do not require anchors to maintain station, and these are not typically deployed for exploration activities, with positioning achieved using several tugs, with station being maintained by contact of the rig spudcans with the seabed. Anchors may be deployed to achieve precision siting over fixed installations or manifolds at injection facilities, which are not considered in this assessment.	It is assumed that jack-up rigs will be three or four-legged rigs with 20m diameter spudcans with an approximate seabed footprint of 0.001km^2 within a radius of *ca*. 50m of the rig centre. For the assessment it is assumed that effects may occur within 500m of a jack-up rig which would take account of any additional rig stabilisation (rock placement) footprint. A short review of 18 Environmental Statements, which included drilling operations in the southern North Sea since 2007 (specifically in quadrants 42, 43, 44, 47, 48, 49 and 53) indicated that rig stabilisation was either not considered necessary and/or assessed as a worst-case contingency option. Where figures were presented, the spatial scale of potential rock placement operations was estimated at between 0.001-0.004km^2 per rig siting. Mud mats are routinely used in offshore oil and gas, and offshore wind, infrastructure. In particular they tend to be used below templates and pipeline end manifolds to control vertical and lateral movements of the structures, and also on the footings of jacket-type structures to provide on-bottom stability prior to the installation of piles, particularly on soft sediments (Dunne & Martin 2017, IFC 2021, Shell 2022, Ørsted 2022). Mud mats are generally made from steel, and are used to distribute the weight of the overlying infrastructure but also control lateral movements (Dunne & Martin 2017). There is the potential to use mud mats for jack-up rig drilling (Stewart 2007) as an alternative to rock placement, though examples are fewer than for fixed infrastructure. Mud mats, if used, would be expected to be removed as part of the overall drilling programme, and would, therefore, represent only a temporary feature which would be permanently removed on completion of the work programme.
Marine discharges	Typically around 1,000 tonnes of cuttings (primarily rock chippings) result from drilling an exploration well. Water-based mud cuttings are typically discharged at, or relatively close to sea surface during “closed drilling” (i.e. when steel casing in the well bore and a riser to	The distance from source within which smothering or other effects may be considered possible is generally a few hundred metres. For the assessment it is assumed that effects may occur within 500m of

Potential activity	Description	Assumptions used for assessment
	the rig are in place), whereas surface hole cuttings are normally discharged at seabed during "open-hole" drilling. Use of oil based mud systems, for example in highly deviated sections or in drilling water reactive shales, would require onshore disposal or treatment offshore to the required standards prior to discharge.	the well location covering an area in the order of 0.8km^2 (refer to Section 4.2 for supporting information).
Conductor piling	Well surface holes are usually drilled "open-hole" with the conductor subsequently inserted and cemented in place to provide a stable hole through which the lower well sections are drilled. Where the nature of the seabed sediment and shallow geological formations are such that they would not support a stable open-hole (i.e. risking collapse), the conductor may be driven into the sediments. In North Sea exploration wells, the diameter of the conductor pipe is usually 26" or 30" (<1m), which is considerably smaller than the monopiles used for offshore wind farm foundations (>3.5m diameter), and therefore require less hammer energy and generate noise of a considerably lower amplitude. For example, hammer energies to set conductor pipes are in the order of 90-270kJ (see: Matthews 2014, Intermoor website), compared to energies of up to 3,000kJ in the installation of piles at some southern North Sea offshore wind farm sites. Direct measurements of underwater sound generated during conductor piling are limited. Jiang *et al.* (2015) monitored conductor piling operations at a jack-up rig in the central North Sea in 48m water depth and found peak sound pressure levels (L_{pk}) not to exceed 156dB re 1 µPa at 750m (the closest measurement to source) and declining with distance. Peak frequency was around 200Hz, dropping off rapidly above 1kHz; hammering was undertaken at a stable power level of 85 ±5 kJ but the pile diameter was not specified (Jiang *et al.* 2015). MacGillivray (2018) reported underwater noise measurements during the piling of six 26" conductors at a platform, six miles offshore of southern California in 365m water depth. After initially penetrating the seabed under its own weight, each conductor was driven approximately 40m further into the seabed (silty-clay and clayey-silt) with hammer energies that increased from 31 ±7 kJ per strike at the start of driving to 59 ±7 kJ per strike. Between 2.5-3 hours of active piling was required per conductor. Sound levels were recorded by fixed hydrophones positioned at distances of 10-1,475m from the source and in water depths of 20-370m, and by a vessel-towed hydrophone. The majority of sound energy was between 100-	The need to pile conductors is well-specific and is not routine. It is anticipated that a conductor piling event would last between 4-6 hours, during which time impulses sound would be generated primarily in the range of 100-1,000Hz, with each impulse of a sound pressure level of approximately 150dB re 1µPa at 500m from the source.

Potential activity	Description	Assumptions used for assessment
	1,000Hz, with peak sound levels around 400Hz. Broadband sound pressure levels recorded at 10m from source and 25m water depth were between 180-190dB re 1µPa (SEL = 173-176dB re 1µPa·s), reducing to 149-155dB re 1µPa at 400m from source and 20m water depth (SEL = 143-147dB re 1µPa·s).	
Rig/vessel presence and movement	On site, the rig is supported by supply and standby vessels, and helicopters are used for personnel transfer.	Supply vessels typically make 2-3 supply trips per week between rig and shore. Helicopter trips to transfer personnel to and from the rig are typically made several times a week. A review of Environmental Statements for exploratory drilling suggests that the rig could be on location for, on average, up to 10 weeks. Support and supply vessels (50-100m in length) are expected to have broadband source levels in the range 165-180dB re 1µPa@1m, with the majority of energy below 1kHz (OSPAR 2009). Additionally, the use of thrusters for dynamic positioning has been reported to result in increased sound generation (>10dB) when compared to the same vessel in transit (Rutenko & Ushchipovskii 2015).
Well evaluation (e.g. Vertical Seismic Profiling)	Sometimes conducted to assist with well evaluation by linking rock strata encountered in drilling to seismic survey data. A seismic source (airgun array, typically with a source size around 500 in^3 and with a maximum of 1,200 in^3, Stone 2015) is deployed from the rig, and measurements are made using a series of geophones deployed inside the wellbore.	VSP surveys are of short duration (one or two days at most).

2.3 Relevant sites

Sites were considered for inclusion/exclusion in the screening process based on whether there was an impact pathway[5] between the marine features for which they are designated and potential initial term activities which could arise following licensing (see Table 2.1). Sites considered include relevant designated MCZs, nature conservation and historic MPAs, and pilot Highly Protected Marine Areas (HPMAs). The designations covering the first three pilot HPMAs in English waters came into force in July 2023[6]. All sites considered in this assessment are mapped in Figure 2.1 to Figure 2.3 and further details including their designation type and protected features are provided in Appendix A. The sources of site data include the JNCC[7], Natural England[8], NatureScot[9] and Historic Environment Scotland[10] websites.

[5] Based on knowledge of potential sources of effect resulting from the activities and pathways by which these effects may impact receptors present on the site (from previous Department SEAs, SNCB advice on operations and literature sources etc). Also refer to Section 4.2.
[6] https://jncc.gov.uk/our-work/english-highly-protected-marine-areas/
[7] https://jncc.gov.uk/our-work/marine-conservation-zones/
[8] https://designatedsites.naturalengland.org.uk/
[9] https://sitelink.nature.scot/home
[10] http://portal.historicenvironment.scot/

Figure 2.1: Blocks applied for and relevant sites: West of Shetland, northern and central North Sea

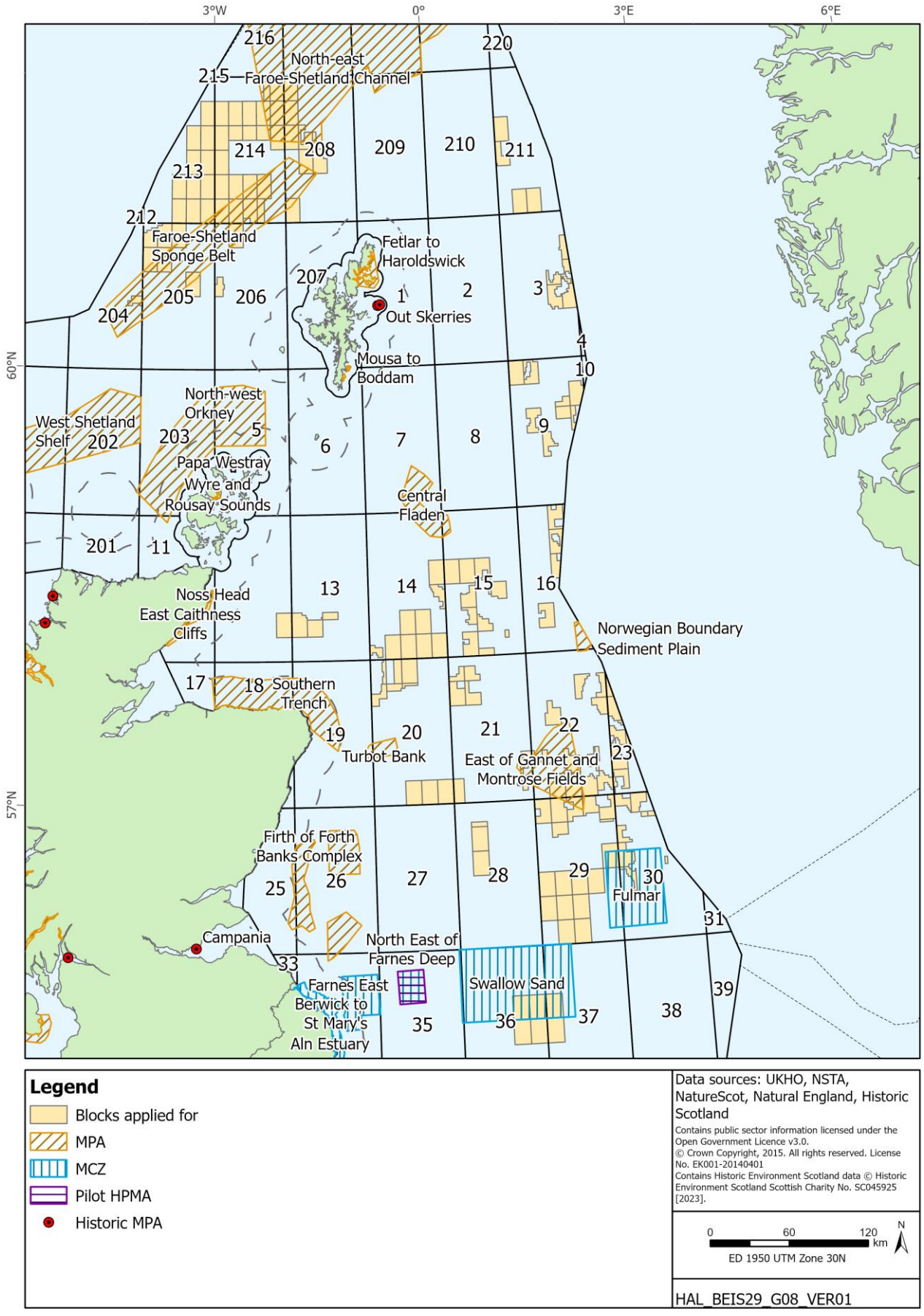


Figure 2.2: Blocks applied for and relevant sites: southern North Sea

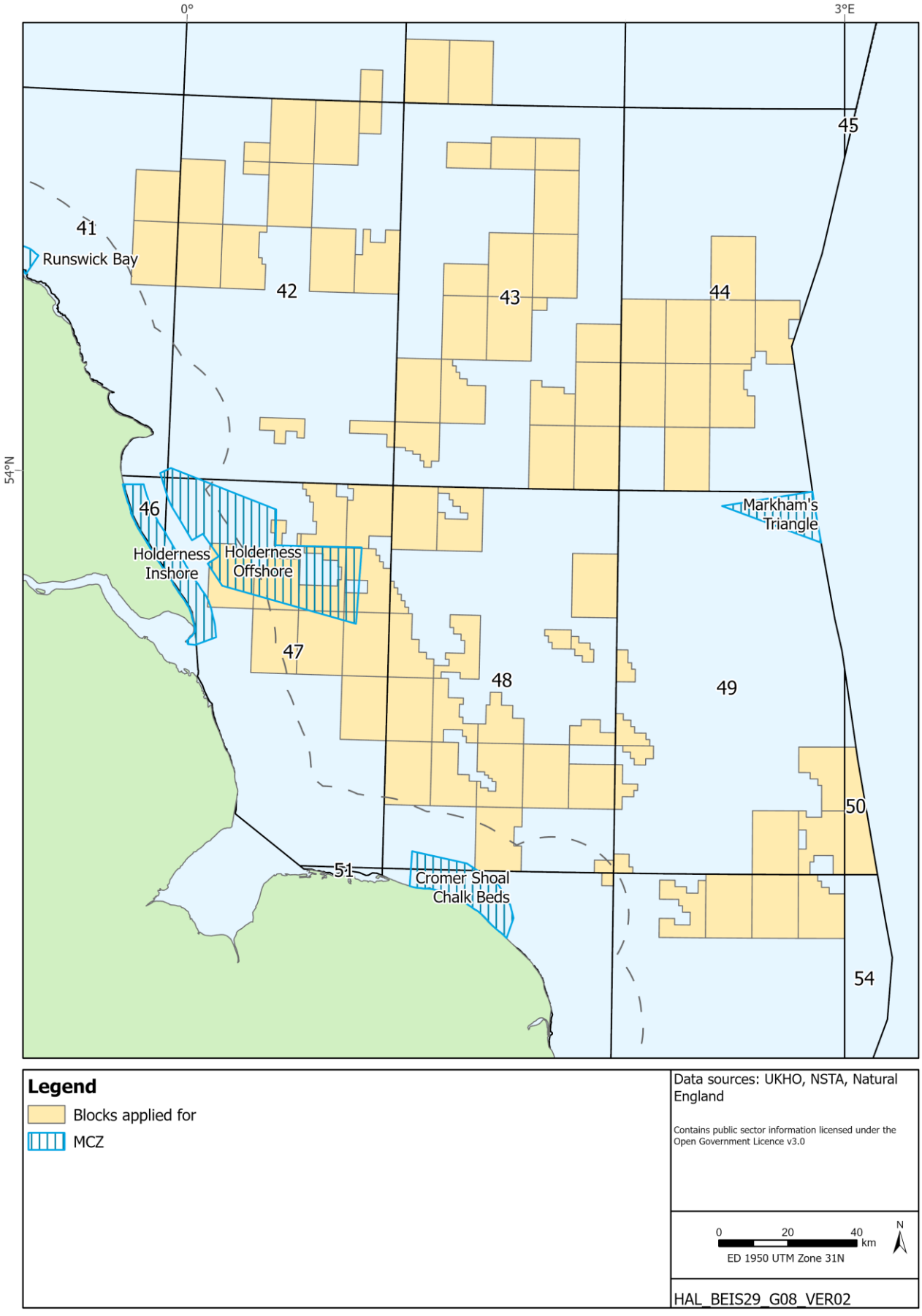
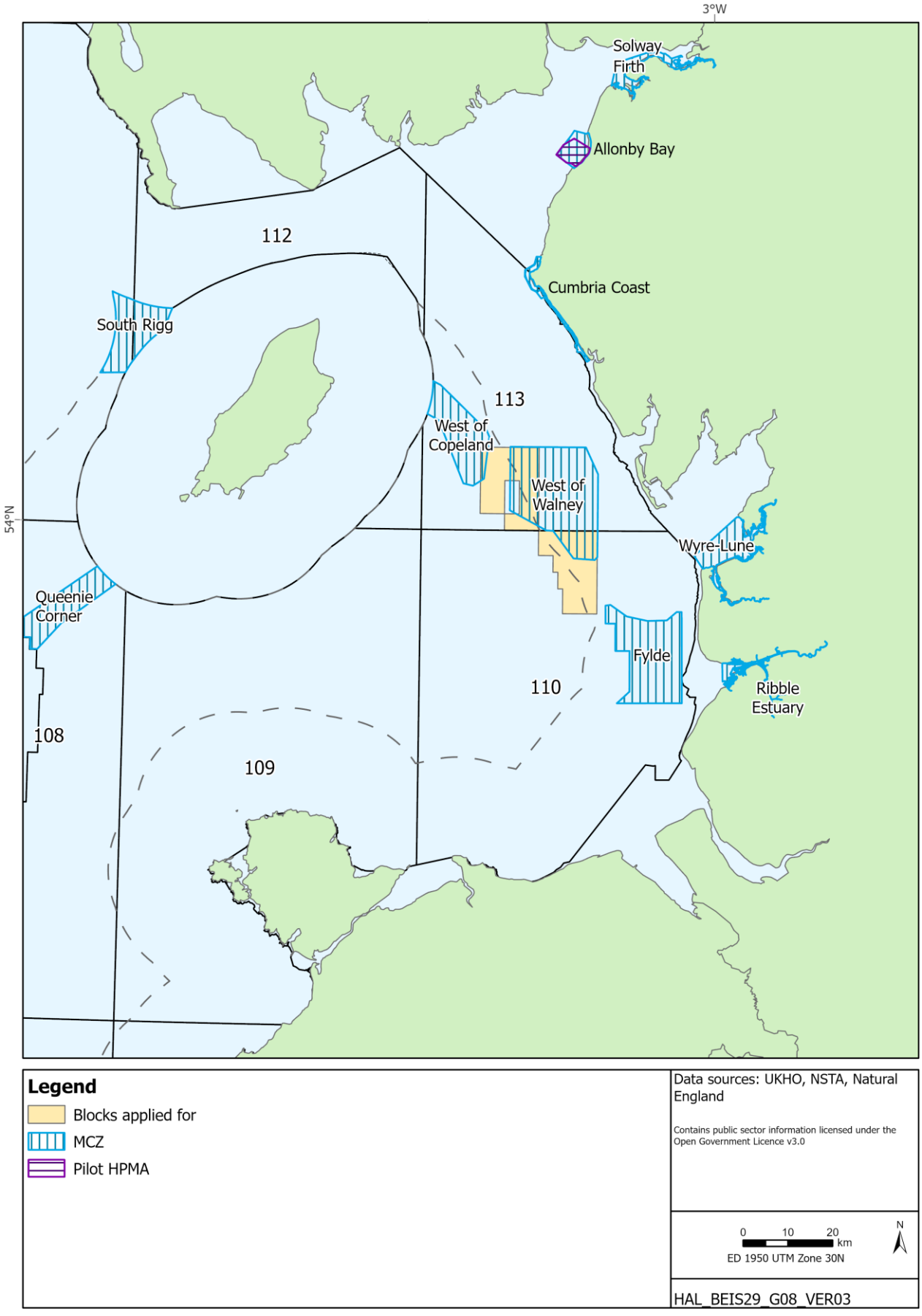


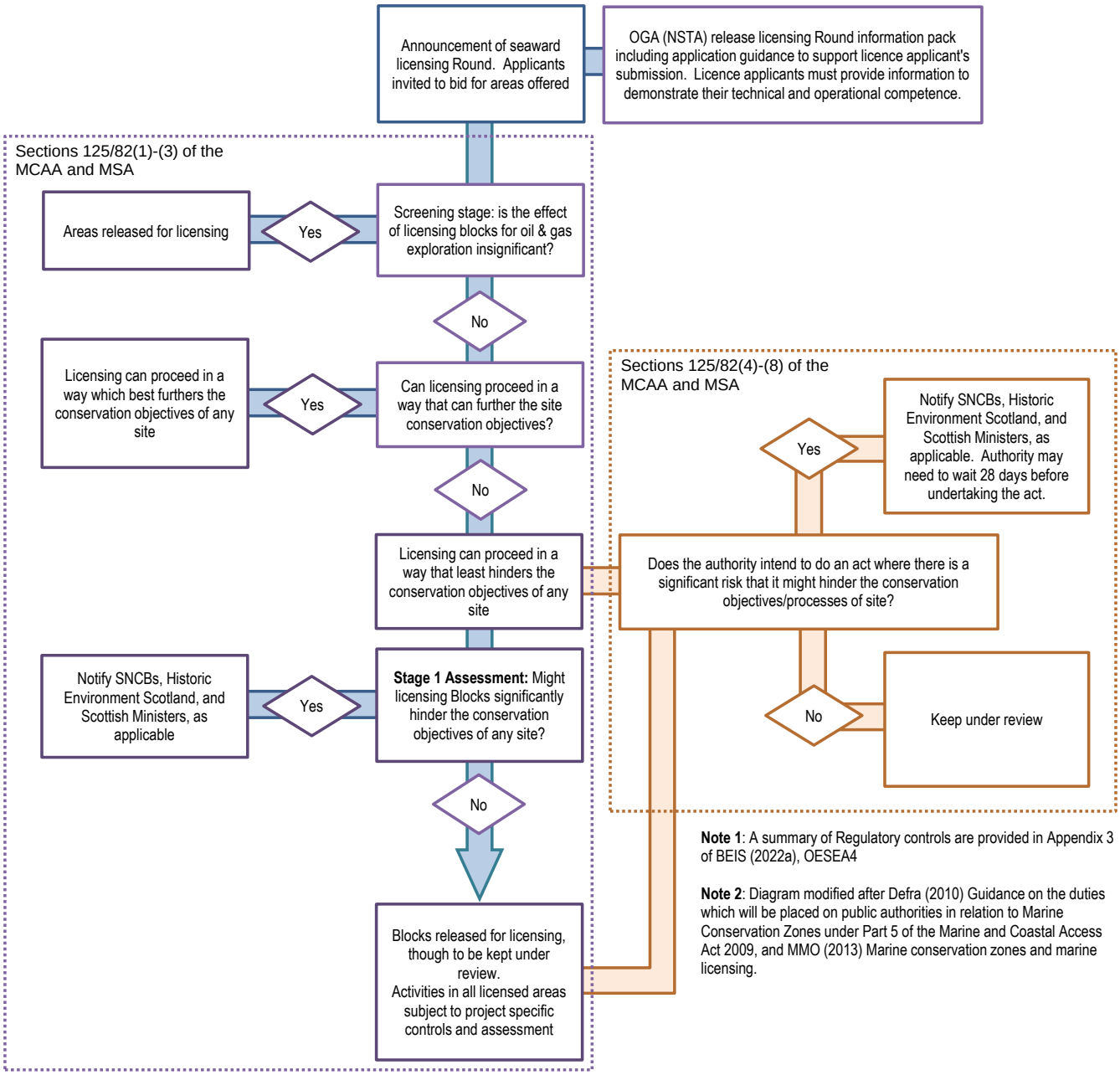
Figure 2.3: Blocks applied for and relevant sites: eastern Irish Sea



3 Assessment Process

The assessment has considered available guidance on the assessment of MCZs/MPAs (Defra 2010, MMO 2013), however, in view of the stage at which the licensing decision is taken, Section 126 of the MCAA, to which MMO (2013) relates, would be relevant at the project level. In the absence of other guidance, this assessment takes account of the general framework provided in MMO (2013), Defra (2010), and the wording of Section 125 of the MCAA and 82 of the M(S)A. A high level overview of the MCZ/MPA assessment process modified after Defra (2010) and MMO (2013) is shown in Figure 3.1. Note that while Sections 125/82(4)-(8) of the Acts are covered in this diagram for completeness, they are not considered to apply to this assessment.

Figure 3.1: Stages of the MCZ/MPA assessment



Note 1: A summary of Regulatory controls are provided in Appendix 3 of BEIS (2022a), OESEA4

Note 2: Diagram modified after Defra (2010) Guidance on the duties which will be placed on public authorities in relation to Marine Conservation Zones under Part 5 of the Marine and Coastal Access Act 2009, and MMO (2013) Marine conservation zones and marine licensing.

3.1 Screening

The screening is intended to determine the sites and related Blocks applied for that should be subject to further "Stage 1" assessment (see Section 4.2). MMO (2013) provides the following tests to ascertain whether further assessment is required, modified here to account for Scottish sites, which are:

- the licensable activity is taking place within or near an area being put forward or already designated as an MCZ or MPA; and
- the activity is capable of affecting (other than insignificantly) either (i) the protected features of an MCZ or MPA; or (ii) any ecological or geomorphological process on which the conservation of any protected feature of an MCZ or MPA is (wholly or in part) dependant[11].

The approach taken to assessment has been to:

- Define the likely location and nature of exploration/appraisal activities that could follow licensing (Section 2).
- Identify all relevant sites and their protected features with the potential to be affected by exploration/appraisal activities (i.e. those sites with marine features or with a marine ecological linkage) (Section 3).
- Screen the relevant sites based on their location relative to the Blocks applied for in the 33rd Seaward Licensing Round, and the potential for their features, or ecological and geomorphological processes, to be significantly affected (Section 4).
- For those sites which are screened in, undertake a "Stage 1" assessment (Section 5).

The screening is informed by an evidence base on the environmental effects of oil and gas exploration and appraisal related activities derived from the scientific literature, and relevant Strategic Environmental Assessments (e.g. DECC 2009, 2011, 2016, BEIS 2022a). Particular use is made of the most recent Offshore Energy SEA (OESEA4), specifically Section 5, which covers a broader range of relevant effects, for example, those relating to the potential for physical damage effects on the historic environment, or the potential for effects on geomorphological processes. Additionally, the screening makes use of the information base presented in the Habitats Regulations Assessment (HRA) for the 33rd Seaward Oil and Gas Licensing Round (BEIS 2022b)[12], which is considered to be relevant to many aspects of this assessment, including relevant pressures identified in a review of the advice on operations/conservation management advice for the MCZ and nature conservation MPA site network. This evidence base allows for the identification of a set of distance-based screening criteria (Table 3.1). These can be taken to reflect what "near" means in relation to the first screening test in MMO (2013) for sites which do not overlap any of the Blocks applied for. Where sites are located within the screening distances set out in Table 3.1, it is considered

[11] This part is consistent with Section 125(1) of the *Marine and Coastal Access Act 2009* (as amended)
[12] https://www.gov.uk/guidance/offshore-energy-strategic-environmental-assessment-sea-an-overview-of-the-sea-process#appropriate-assessment

that activities would be capable of affecting (other than insignificantly) a site's features or functions and a Stage 1 assessment will be undertaken (Section 3.2).

A limited number of MCZ or MPA sites are designated for mobile species (marine mammals – also see Section 3.4.2, birds, and fish) which may be present beyond site boundaries. The following relevant mobile species are currently protected in relevant MCZ or MPAs:

- Minke whale
- Risso's dolphin
- Black guillemot
- Basking shark
- Flapper skate
- Blue ling
- Razorbill

As cetaceans are listed on Annex IV of the Habitats Directive, they are subject to separate protections beyond the boundaries of sites for which they are designated (including Special Areas of Conservation, see BEIS 2022b), and therefore protections for these species beyond the boundaries of MCZs or MPAs are similarly considered to be covered by the *Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001* and the *Conservation of Offshore Marine Habitats and Species Regulations 2017*. On this basis, the screening criteria outlined below in relation to disturbance and noise are considered to be relevant.

While flapper skate is a protected feature of some Scottish MPAs, overall its range has significantly contracted across the wider North Sea and its distribution beyond the boundaries of any MPA are unknown; the screening criteria below are considered to be sufficient to identify relevant sites for which effects could be significant.

Basking shark sightings peak in summer, including in areas of the Minch, Isle of Man and Cornwall, but it is less clear where they spend their winter (see Appendix 1a.4 of BEIS 2022a). They have been recorded all around Scotland but are found in larger numbers in the Sea of the Hebrides MPA, the only site for which this species is designated as a feature. There is relatively limited understanding of the distribution of basking shark in the regions containing the areas applied for, and limited ability to attribute individual sightings in areas such as the Irish Sea to the populations of any individual site (i.e. Sea of the Hebrides MPA). In view of this, the screening criteria outlined below are considered to be relevant to the identification of relevant sites for which effects could be significant.

Two bird species have been designated in MPAs or MCZs, black guillemot (Fetlar to Haroldswick MPA, Papa Westray MPA, East Caithness Cliffs MPA) and razorbill (Cumbria Coast MCZ). Black guillemot is reported to have a maximum foraging range of 8km from the coast (Woodward *et al.* 2019), which limits the potential interaction between this species and UKCS Blocks. Razorbill was added as a protected feature to the Cumbria Coast MCZ in 2019 for the population at St Bees Head, along with a small extension to the site boundary specifically relating to the protection of razorbill; this feature was considered to be in

unfavourable condition at the time it was added to the site. While razorbill has a mean maximum foraging range of 73.8±48.4km[13], modelling by Cleasby *et al.* (2018) has revealed hotspots for breeding seabird use in relation to UK colonies, mapped as utilisation distributions (UD), with those for razorbill around St Bees Head showing a relatively limited distribution, with 95% UD being within 22km of the coast and the extension which was added to the site.

Other protected species include smelt, giant goby, seahorse and sandeel, however, the range of these species is limited or the nature of the protection of the features (e.g. in the case of sandeel for recruitment), is such that the distance based screening criteria below are considered to be relevant.

Table 3.1: Screening criteria used in this assessment to determine the potential for sites to be significantly affected

Physical and drilling effects: any Block applied for should be screened in if it is within or overlaps with a site, together with any area within a buffer of 10km from a MPA or MCZ where there is a potential interaction between site features and exploration/appraisal activities in the area.
Underwater noise effects: any Block applied for that is within 15km of a MPA or MCZ with qualifying features regarded as sensitive to underwater noise (e.g. marine mammals, diving birds, and fish) should be screened in. In the context of measurements and modelling for the different sound sources, established injury threshold criteria and, relevant studies of observed effects, including those in the UKCS, 15km is considered to be a conservative estimate of a maximum distance within which likely significant effects could be expected from the loudest noise sources associated with seismic survey activities.

3.2 Stage 1 assessment

The information base referred to in Section 3.1 and the MCZ/MPA site-specific information has been used to inform the Stage 1 assessment to determine whether (MMO 2013[14]):

- the Department can exercise its functions to further the conservation objectives stated for the MCZ or MPA; and
- there is no significant risk of the activity hindering the achievement of the conservation objectives stated for the MCZ or MPA.

If the exercise of the function would or might significantly hinder the achievement of the conservation objectives for an MCZ or MPA, the appropriate statutory conservation bodies, and where relevant Scottish Ministers, must be notified. As the Department's function at this

[13] Excludes data for Fair Isle where foraging range may have been unusually high as a result of reduced prey availability during the study year.
[14] Modified here to relate the stage of assessment to Section 125 and Section 82 of the *Marine and Coastal Access Act* and *Marine (Scotland) Act*, and to account for the consideration of MPAs in Scottish Waters.

stage is only in agreeing, or otherwise, to the issue of a seaward production licence, it is not considered that Sections 125 (4)-(11) or Section 126 apply to this assessment.

The meaning of "hinder" has been taken to mean whether the Department's function in licensing could, alone or in-combination (MMO 2013):

- in the case of a conservation objective of "maintain", increase the likelihood that the current status of a feature would go downwards (e.g. from favourable to degraded) either immediately or in the future (i.e. they would be placed on a downward trend); or

- in the case of a conservation objective of "recover", decrease the likelihood that the current status of a feature could move upwards (e.g. from degraded to favourable) either immediately or in the future (i.e. they would be placed on a flat or downward trend).

Similarly, "further" can be taken to be where the Department's functions could:

- in the case of a conservation objective of "maintain", increase the likelihood that the current status of a feature would be maintained either immediately or in the future; or

- in the case of a conservation objective of "recover", increase the likelihood that the current status of a feature could move upwards (e.g. from degraded to favourable) either immediately or in the future.

Based on the above definitions, the function to which this assessment relates is unlikely to further the conservation objectives for any site, particularly in the current absence of a framework for net gain in the marine environment[15]. It is therefore concluded at this stage, that those sites screened into the assessment would proceed to a Stage 1 assessment on the basis that the Department would seek to proceed with licensing in a way that least hinders the conservation objectives of any site.

3.3 Cumulative effects

The Stage 1 assessment also considers the potential for cumulative effects resulting from the interaction of exploration/appraisal activities in the Blocks applied for with activities resulting from other marine plans, programmes and activities to lead to likely significant effects on relevant sites.

Marine planning has a key role in informing strategic and project level spatial considerations, with the Marine Policy Statement indicating, *"Marine Plans should reflect and address, so far as possible, the range of activities occurring in, and placing demands on, the plan area. The Marine Plan should identify areas of constraint and locations where a range of activities may be accommodated. This will reduce real and potential conflict, maximise compatibility between marine activities and encourage co-existence of multiple uses."*

[15] See: https://www.gov.uk/government/consultations/consultation-on-the-principles-of-marine-net-gain noting that such net gain would be separate, and in addition to, any measures considered to be of equivalent environmental benefit.

Marine plans adopted in England and Scotland cover all of the Blocks applied for. To date, whilst the marine plans acknowledge the potential interactions between activities and map these, indicate key resource areas and provide policy context and direction in relation to potential activity interactions, they are not spatially prescriptive and provide a limited indication of the location of possible future development, how co-location may be accommodated, or any form of activity prioritisation.

The uncertainty over the scale and timing of activities which could follow licensing of 33rd Round and the activities resulting from other plans and programmes is recognised. A GIS has been used to allow the Blocks applied for to be considered in the context of activities and proposals for a range of marine activities/potential activities.

3.4 Existing regulatory requirements and controls

This assessment assumes that the high-level controls described below are applied as standard to activities since they are legislative requirements. These are distinct from further control measures which may be identified and employed to avoid significant effects on relevant sites. These further control measures are identified in Sections 5.1-5.2 for the two main sources of effect identified: physical disturbance and underwater noise.

3.4.1 Physical disturbance and marine discharges

The routine sources of potential physical disturbance and drilling effects associated with exploration and appraisal are assessed and controlled through a range of regulatory processes, such as the *Offshore Oil and Gas Exploration, Production, Unloading and Storage (Environmental Impact Assessment) Regulations 2020* as part of the Drilling Operations Applications[16].

There is a mandatory requirement to have sufficient recent and relevant data to characterise the seabed in areas where activities are due to take place (e.g. rig placement)[17]. If required, survey reports must be made available to the relevant statutory bodies on submission of a relevant permit application or Environmental Statement for the proposed activity. The identification of any sensitive habitats by such survey (e.g. those under Annex I of the Habitats Directive or on the OSPAR List of Threatened and/or Declining Species and Habitats) may influence the Department's decision on a project-level consent.

Discharges from offshore facilities, including drilling rigs used to drill oil and gas wells, have been subject to increasingly stringent regulatory controls over recent decades (see review in BEIS 2022a, and related Appendices 2 and 3). As a result, contaminant concentrations in drilling wastes have been substantially reduced or eliminated (e.g. the discharge of oil based muds and contaminated cuttings is effectively banned), with discharges of chemicals exceeding permit conditions or any unplanned release, potentially constituting a breach of the permit conditions and an offence. Drilling chemical use and discharge is subject to strict regulatory control through permitting, monitoring and reporting (e.g. the mandatory Environmental Emissions Monitoring System (EEMS) and annual environmental performance reports). The use and discharge of chemicals must be risk assessed as part of the permitting process under the *Offshore Chemicals Regulations 2002* (as amended), and the discharge of

[16] https://www.gov.uk/guidance/oil-and-gas-offshore-environmental-legislation
[17] BEIS (2021). The Offshore Oil and Gas Exploration, Production, Unloading and Storage (Environmental Impact Assessment) Regulations 2020 - A guide. July 2021 - Revision 3.

chemicals which would be expected to have a significant negative impact would not be permitted.

At the project level, discharges would be considered in detail in project-specific EIAs and chemical risk assessments under existing permitting procedures.

3.4.2 Underwater noise effects

Controls are in place to cover all significant noise generating activities on the UKCS, including geophysical surveying. Seismic surveys (including VSP and high-resolution site surveys), sub-bottom profile surveys and shallow drilling activities require an application for consent under the *Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001* (as amended) and cannot proceed without consent. These applications are supported by an environmental assessment, which includes a noise assessment. On the noise thresholds to be used as part of any assessment, applicants are encouraged to seek the advice of relevant SNCB(s) (JNCC 2017) in addition to referring to European Protected Species (EPS) guidance (JNCC 2010). Note that EPS guidance is relevant to this assessment as all cetaceans are listed on Annex IV of the Habitats Directive, and therefore any cetaceans which are protected features of MCZs or MPAs would also be covered by this guidance.

The Department consults the relevant statutory nature conservation bodies on the consent applications for advice and a decision on whether to grant consent is only made after careful consideration of their comments. Statutory nature conservation bodies may request additional information or risk assessment, specific additional conditions to be attached to consent (such as specifying timing or other specific control measures) or advise against consent.

It is a condition of consents issued under Regulation 4 of the *Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001* (as amended) for seismic and sub-bottom profile surveys that the JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys are followed. Where appropriate, EPS disturbance licences may also be required under the *Conservation of Offshore Marine Habitats and Species Regulations 2017*[18], and further assessment may be required under Section 126 and 83 of the MCAA and M(S)A respectively. The updated JNCC guidelines (2017) reaffirm that adherence to these guidelines constitutes best practice and will, in most cases, reduce the risk of deliberate injury to marine mammals to negligible levels. Applicants are expected to make every effort to design a survey that minimises sound generated and consequent likely impacts, and to implement best practice measures described in the guidelines.

[18] Disturbance of European Protected Species (EPS) (i.e. those listed in Annex IV) is a separate consideration under Article 12 of the Habitats Directive, and is not considered in this assessment.

4 Screening

The screening criteria (see Section 3.1) were applied which led to the identification of a number of site/block combinations for which it was considered that effects of licensing could be significant (Table 4.1 and Figure 4.1-Figure 4.2). A Stage 1 assessment has been undertaken for these sites (Section 5). In view of the nature of the features screened in, only effects relating to physical disturbance and marine discharges are considered to be possible.

Table 4.1: Sites screened into the Stage 1 assessment

Site Name	Designated features	Feature status	Blocks applied for
WEST OF SHETLAND, NORTHERN AND CENTRAL NORTH SEA			
Faroe-Shetland Sponge Belt MPA	Continental slope, Deep sea sponge aggregations, Marine Geomorphology of the Scottish Deep Ocean Seabed, Offshore subtidal sands and gravels, Submarine Mass Movement, Quaternary of Scotland, Ocean quahog aggregations (*Arctica islandica*)	All features considered to be in unfavourable condition other than Continental slope (large-scale feature), which is considered to be in favourable condition.	204/20d, 205/14, 205/1b, 205/2b, 205/3, 205/6, 205/7, 206/2, 208/11, 208/12b, 208/17, 208/18b, 208/26, 213/25, 213/28, 213/29, 213/30, 214/15, 214/21, 214/22, 214/23, 214/24, 214/26, 214/27, 214/28a, 214/29a
North-east Faroe-Shetland Channel MPA	Quaternary of Scotland, Submarine Mass Movement, Cenozoic Structures of the Atlantic Margin, Continental slope, Deep sea sponge aggregations, Marine Geomorphology of the Scottish Deep Ocean Seabed, Offshore deep sea muds, Offshore subtidal sands and gravels	All features considered to be in favourable condition other than Deep-sea sponge aggregations, which is considered to be in an unfavourable condition.	208/1, 208/11, 208/12b, 208/13b, 208/17, 208/18b, 208/6, 214/10, 214/13b, 214/14a, 214/15, 214/4a, 214/5, 214/8, 214/9
East of Gannet and Montrose Fields MPA	Offshore subtidal sands and gravels, Offshore deep sea muds, Ocean quahog aggregations (*Arctica islandica*)	All features are considered to be in unfavourable condition.	21/25c, 21/30g, 22/12b, 22/21d, 22/23c, 22/24f, 22/26e, 22/27, 22/28b, 22/29b, 29/1c, 29/2a, 29/3b, 29/4b
Fulmar MCZ	Subtidal sand, Subtidal mud, Subtidal mixed sediments, Ocean quahog (*Arctica islandica*)	All features are considered to be in favourable condition.	29/15, 29/19, 30/11c, 30/13b, 30/16g, 30/6c
Swallow Sand MCZ	Subtidal coarse sediment, Subtidal sand, North Sea glacial tunnel valley (Swallow Hole)	All features are considered to be in favourable condition.	29/27, 29/28, 36/14, 36/15, 36/19, 36/20, 37/11, 37/16
SOUTHERN NORTH SEA			
Cromer Shoal Chalk Beds MCZ	High energy circalittoral rock, High energy infralittoral rock, Moderate energy circalittoral rock, Moderate energy infralittoral rock, North Norfolk coast (Subtidal), Peat and clay exposures, Subtidal chalk, Subtidal coarse sediment, Subtidal mixed sediments, Subtidal sand	Feature condition assessment is not available. The attributes considered in the site SACO indicate a "maintain" target for most features, inferring favourable status[1]. The attribute, "Structure and function: presence and abundance of key structural and influential species" has a target to maintain, or recover, or restore, suggesting uncertainty in the status of this attribute for all relevant site features.	48/28b

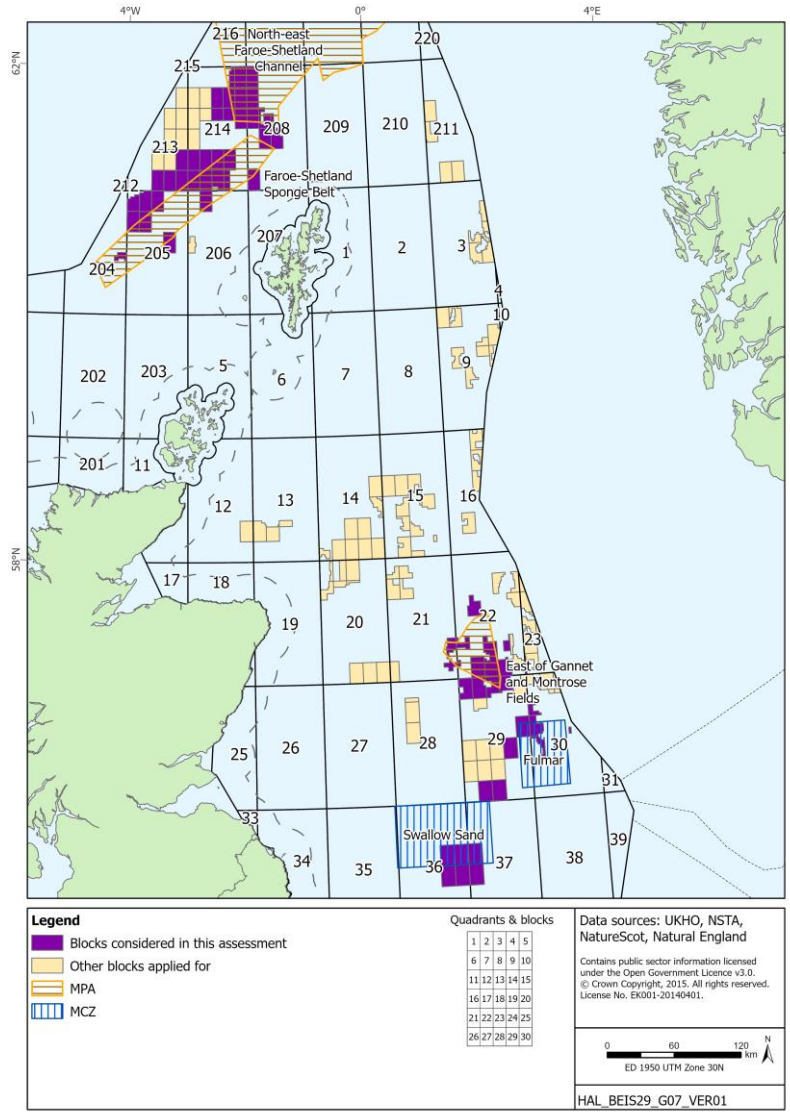
Site Name	Designated features	Feature status	Blocks applied for
Holderness Inshore MCZ	High energy circalittoral rock, Intertidal sand and muddy sand, Moderate energy circalittoral rock, Subtidal coarse sediment, Subtidal mixed sediments, Subtidal mud, Subtidal sand, Spurn Head (Subtidal; geomorphological interest feature)	Feature condition assessment is not available. The attributes considered in the site SACO indicate a "maintain" target for most features, inferring favourable status[1]. The attribute, "Structure and function: presence and abundance of key structural and influential species" has a target to maintain, or recover, or restore, suggesting uncertainty in the status of this attribute for all relevant site features.	47/7b
Holderness Offshore MCZ	Subtidal coarse sediment, Subtidal sand, Subtidal mixed sediments, Ocean quahog (*Arctica islandica*); North Sea glacial tunnel valleys (geological interest feature)	All features are considered to be in unfavourable condition other than the North Sea glacial tunnel valleys, which are in favourable condition.	47/10c, 47/13, 47/14, 47/15, 47/3j, 47/3k, 47/4d, 47/5b, 47/7b, 47/8a, 47/9a, 48/1, 48/11b, 48/6c
Markham's Triangle MCZ	Subtidal coarse sediment, Subtidal sand, Subtidal mud, Subtidal mixed sediments	Subtidal coarse sediment, Subtidal sand are considered to be in favourable condition; Subtidal mud, Subtidal mixed sediments are considered to be in unfavourable condition.	44/27
EASTERN IRISH SEA			
Fylde MCZ	Subtidal sand, subtidal mud	Feature condition assessment is not available. The attributes considered in the site SACO indicate a "maintain" target for most features, inferring favourable status. The attribute, "Structure and function: presence and abundance of key structural and influential species" has a target to maintain, or recover, or restore, suggesting uncertainty in the status of this attribute for all relevant site features. No site-specific supporting notes are available to better understand this target.	110/3b
West of Copeland MCZ	Subtidal coarse sediment, Subtidal sand, Subtidal mixed sediments	Subtidal coarse sediment and Subtidal sand are considered to be in unfavourable condition; Subtidal mixed sediments considered to be in favourable condition.	113/27c
West of Walney MCZ	Sea-pen and burrowing megafauna communities, Subtidal mud, Subtidal sand	Feature condition assessment is not available. The vulnerability assessment for the site suggests it is unlikely to be moving towards its conservation objectives, but site condition monitoring is required to improve this assessment. Recovery targets have been set for the attributes, "Distribution: presence and spatial distribution of biological communities, Structure: species composition of component communities" – site specific notes indicate this target is based on the vulnerability assessment.	113/27c

Notes: [1]No site-specific supporting notes are available to better understand these targets

The conclusion of the screening stage is that of the 258 Blocks or part-Blocks applied for, 82 had a pathway that could potentially lead to significant effects on a site and its features. All other Blocks applied for (see Figures 4.1 and 4.2) were screened out.

Figure 4.1: Areas applied for and sites screened in

West of Shetland, Northern and Central North Sea



Southern North Sea

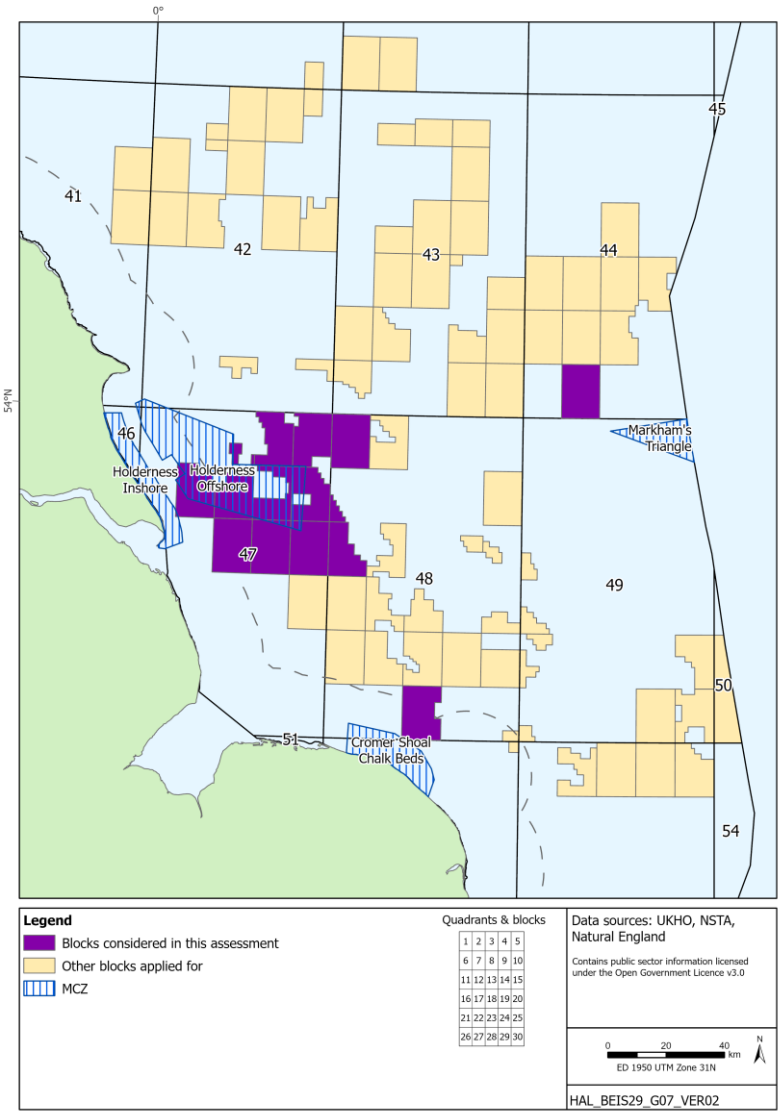
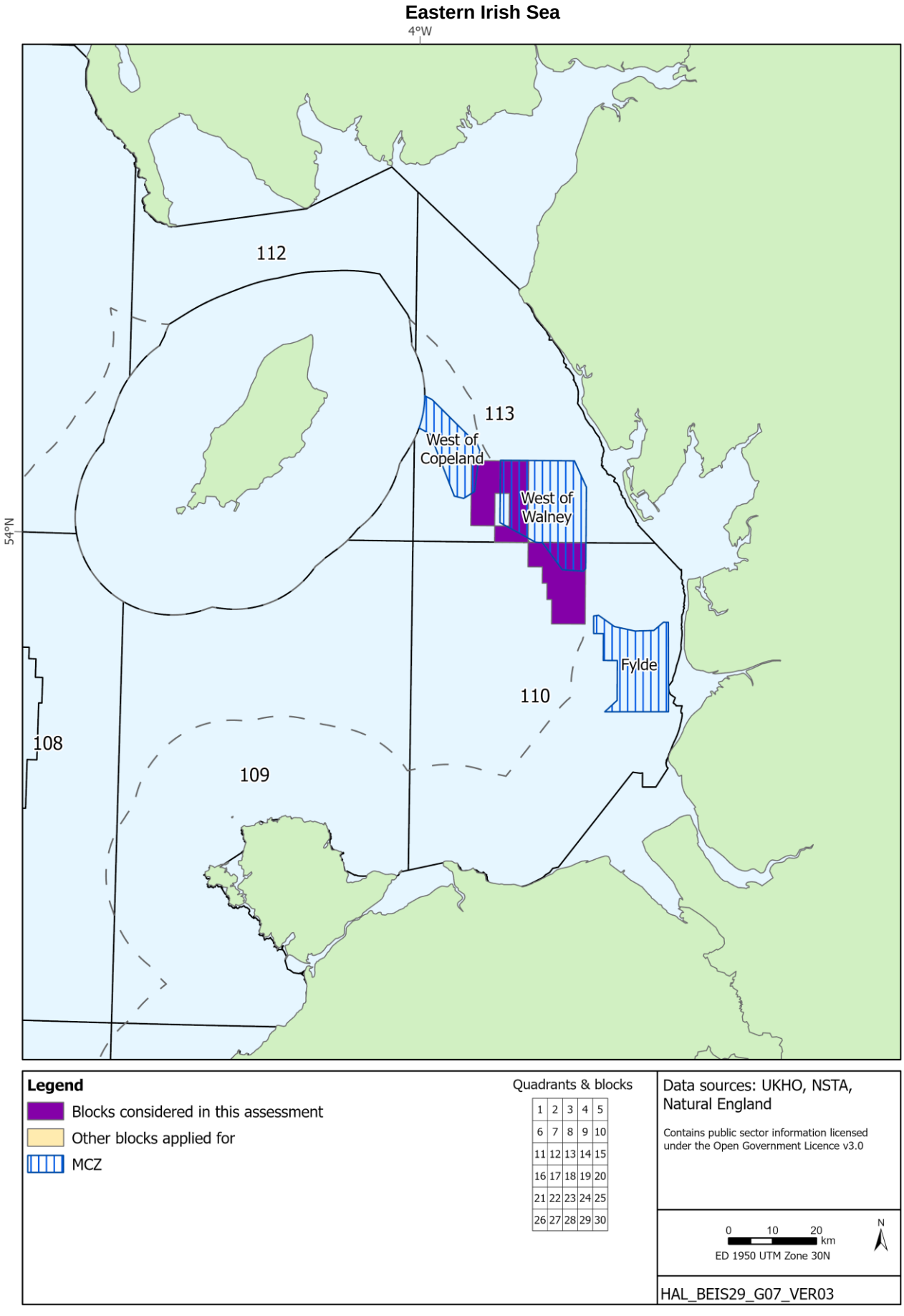


Figure 4.2: Areas applied for and sites screened in (continued)



5 Stage 1 Assessment

The approach used in the Stage 1 assessment has been to take the proposed activity for each of the Blocks as being the maximum of any application for that area, and to assume that all activity takes place. The maximum estimates of work commitments for the relevant areas derived from the applications to the NSTA or that may be considered by the NSTA to be required to enable appropriate appraisal of the areas are shown in Table 5.1.

Completion of the work programmes is likely to involve one or more of the activities summarised in Table 2.1. Subsequent development activity is contingent on successful exploration and appraisal and may or may not result in the eventual installation of infrastructure, but a meaningful assessment of development level activity is not possible at this time. Where the work programmes for some of the Blocks applied for do not involve offshore activities (i.e. shooting new seismic and/or the drilling of wells), related effects are not considered further in this assessment.

Table 5.1: High case work programmes relevant to the areas considered in this assessment

Block	Obtain[19] and/or reprocess 2D or 3D seismic data	Shoot 3D seismic	Wells	Straight to second term
21/25c	✓	-	✓	-
21/30g	-	-	✓	-
22/12b	✓	-	✓	-
22/21d	✓	-	✓	-
22/23c	✓	-	✓	-
22/24f	✓	-	✓	-
22/26e	-	-	✓	-
22/27	✓	-	-	✓
22/28b	✓	-	✓	-
22/29b	-	-	✓	✓
29/1c	✓	-	-	✓
29/2a	✓	-	-	✓
29/3b	✓	-	✓	-
29/4b	✓	-	✓	-

[19] To obtain seismic data means purchasing or otherwise getting the use of existing data and does not involve shooting new seismic.

Block	Obtain[19] and/or reprocess 2D or 3D seismic data	Shoot 3D seismic	Wells	Straight to second term
29/15	✓	-	✓	-
29/19	✓	✓c	✓	-
29/27	✓	✓c	✓	-
29/28	-	✓c	✓	-
30/11c	✓	-	✓	-
30/13b	-	-	-	✓
30/16g	✓	-	✓	-
30/6c	✓	-	✓	-
36/14	✓	✓c	✓	-
36/15	✓	✓c	✓	-
36/19	✓	✓c	✓	-
36/20	✓	✓c	✓	-
37/11	✓	✓c	✓	-
37/16	✓	✓c	✓	-
48/28b	✓	✓	✓	-
47/7b	✓	✓	✓	-
47/10c	✓	-	✓	-
47/13	✓	✓	✓	-
47/14	✓	✓	✓	-
47/15	✓	✓	✓	-
47/3j	✓	-	✓	-
47/3k	✓	-	✓	-
47/4d	✓	-	✓	-
47/5b	✓	-	✓	✓
47/7b	✓	✓	✓	-

Block	Obtain[19] and/or reprocess 2D or 3D seismic data	Shoot 3D seismic	Wells	Straight to second term
47/8a	✓	✓	✓	-
47/9a	✓	-	✓	-
48/1	✓	-	✓	✓
48/11b	-	-	✓	-
48/6c	✓	-	✓	-
44/27	✓	-	✓	-
110/3b	-	-	-	-
113/27c	✓	-	✓	-
204/20d	-	✓c	✓	-
205/14	-	-	✓	-
205/1b	-	✓c	✓	-
205/2b	-	✓c	✓	-
205/3	-	✓c	✓	-
205/6	-	✓c	✓	-
205/7	-	✓c	✓	-
206/2	-	-	✓	-
208/1	✓	✓c	✓	-
208/11	✓	-	✓	-
208/11	✓	-	✓	-
208/12b	-	-	✓	-
208/12b	-	-	✓	-
208/13b	-	-	✓	-
208/17	-	-	✓	-
208/17	-	-	✓	-
208/18b	-	-	✓	-

Block	Obtain[19] and/or reprocess 2D or 3D seismic data	Shoot 3D seismic	Wells	Straight to second term
208/26	-	-	-	✓
208/6	✓	✓c	✓	-
213/25	✓	-	✓	-
213/28	-	✓c	✓	-
213/29	✓	✓c	✓	-
213/30	✓	-	✓	-
214/10	✓	✓	✓	✓
214/13b	✓	✓c	✓	-
214/14a	✓	✓c	✓	-
214/15	✓	✓c	✓	-
214/15	✓	✓c	✓	-
214/21	✓	-	✓	-
214/22	-	-	✓	-
214/23	-	-	✓	-
214/24	-	-	✓	-
214/26	✓	-	✓	-
214/27	-	-	✓	-
214/28a	-	-	✓	-
214/29a	-	-	✓	-
214/4a	✓	✓c	✓	✓
214/5	✓	✓c	✓	✓
214/8	✓	✓c	✓	-
214/9	✓	✓c	✓	✓

Notes: c = contingent

5.1 West of Shetland, Northern and Central North Sea

As noted in Section 4, the source of effect relevant to the West of Shetland, northern and central North Sea sites screened in is for physical disturbance and marine discharges related to exploration/appraisal well drilling. The following sections provide a description of the relevant sites followed by an assessment of the potential for the pressures associated with drilling and discharges to hinder the achievement of site conservation objectives.

5.1.1 Relevant sites

Faroe-Shetland Sponge Belt MPA[20]

The MPA includes four protected habitats/broadscale habitats: deep sea sponge aggregations, ocean quahog aggregations, Atlantic and Arctic influenced slope offshore subtidal sand and gravel habitats, an area of the Faroe-Shetland Channel continental slope. Additionally, the site contains five geodiversity features representative of the West Shetland Margin paleo-depositional system and the West Shetland Margin Contourite Deposits Key Geodiversity Areas (Brooks *et al.* 2013). The site boundaries are based on verified records of deep sea sponge and *Arctica islandica* aggregations following the 400 and 800m isobaths, which is the area thought to contain the highest biological diversity in the channel.

The Faroe-Shetland Channel interacts with five different converging water masses leading to enhanced vertical mixing and productivity in the area (Turrell *et al.* 1999). This mixing serves to focus prey items (Pollock *et al.* 2000, Weir *et al.* 2001; Debes *et al.* 2007) and may enhance foraging activity of top predators. The Faroe-Shetland Channel is thought to be an important migratory pathway for cetaceans such as fin and sperm whales (Pollock *et al.* 2000, Weir *et al.* 2001, Swift *et al.* 2002, Macleod *et al.* 2003, Reid *et al.* 2003). Boreal 'ostur' sponge aggregations occur within the site, and is the only location where they occur in UK waters, and typically have a high abundance of species of giant sponge (Demospongia).

The West Shetland Margin paleo-depositional system geodiversity features form part of a system that was active during the last glacial period and are considered representative examples of a distal, non-ice-contact glacial process transferring material from a former ice margin to a basinal depocentre. The geodiversity features representative of the West Shetland Margin Contourite Deposit form a complex of sandy bedforms that are unique to UK waters.

North-East Faroe-Shetland Channel MPA[21]

The MPA includes three biodiversity features: deep-sea sponge aggregations, Atlantic and Arctic influenced offshore subtidal sands and gravels and offshore deep sea muds on the continental slope and beyond the continental shelf. Like the Faroe-Shetland Sponge Belt MPA, the site is thought to have functional significance for the health and biodiversity of Scottish seas, relating to its location at the convergence of numerous water masses and related enhanced productivity. Up to 50 sponge species can be found within the sponge fields, many of which are different to those found in the surrounding areas. The sponges provide

[20] Site description based on: https://jncc.gov.uk/our-work/faroe-shetland-sponge-belt-mpa, https://data.jncc.gov.uk/data/411ea794-b135-4877-9fc8-e3e6c054eef9/FSSB-3-ApplicationMPASelectionGuidelines-v5.0.pdf, https://data.jncc.gov.uk/data/411ea794-b135-4877-9fc8-e3e6c054eef9/FSSB-2-DataConfidenceAssessment-v5.0.pdf

[21] Site description based on: https://jncc.gov.uk/our-work/north-east-faroe-shetland-channel-mpa/, https://data.jncc.gov.uk/data/599143aa-d0c8-405c-9665-2973e581cdd0/NEFSC-3-ApplicationMPASelectionGuidelines-v4.0.pdf. Also see Appendix 1b of BEIS (2022a).

shelter for a range of small sea life such as pencil urchins (*Cidaris cidaris*) and an elevated perch for animals such as brittlestars. At greater water depths, muddy seabed is home to those species that can tolerate the cooler Arctic-influenced waters, such as deep-sea worms. The channel is also believed to be a corridor for migrating marine mammals, including fin whales and sperm whales.

The MPA includes several features of geological importance, including the Miller Slide and the Pilot Whale Diapirs. The Miller Slide is a series of debris flows up to 95km long occurring on the western edge of the North Sea Fan. The slide has a surface expression covering 5,700km^2, and is estimated to have an age of about 200,000 years (Long *et al.* 2011). Diapirs are geological structures consisting of mobile material that was forced into more brittle surrounding rocks, usually by the upward flow of material from a parent stratum. The diapirs are a series of seabed sediment mounds which measure 2-3km across and rise to more than 70m above the surrounding seafloor. Research has shown the diapirs are just a tiny fraction of more extensive subsurface features, covering more than 2,000km^2. The Pilot Whale Diapirs are unusual in that they are the only known example of diapirs found in UK waters that breach the seabed surface and provide a rare opportunity to directly sample mid-Cenozoic age sediments at the seabed.

East of Gannet and Montrose Fields MPA[22]

The East of Gannet and Montrose Fields MPA lies to the east of Scotland within a relatively shallow sediment plain. About half the seabed within the MPA is dominated by sands and gravels, which are the preferred habitat of the ocean quahog (*Arctica islandica*). The MPA also includes a substantial area of offshore deep-sea mud. Many types of worm and mollusc live buried in the mud and provide an important food source for fish. This is one of the few examples of Atlantic-influenced offshore deep sea mud habitats on the continental shelf in the region, and occur across the south-east half of the MPA, at approximately 100m deep. There is limited evidence of the composition and diversity of the biological communities present in this habitat, but evidence from a monitoring survey in 2015 (O'Connor 2016) showed this to be colonised by animals such as seapens.

Fulmar MCZ[23]

The site is located approximately 224km off the Northumberland coast and its protected features are three broadscale habitats (subtidal sand, subtidal mud, and subtidal mixed sediment) and one species, ocean quahog (*Arctica islandica*). The site occurs in the central North Sea region where the subtidal substrate frequently occurs as a thin layer of sediment covering the underlying bedrock, glacial drift or mud. Species found in the site include burrowing tube anemones (*Cerianthus lloydii*), brittlestars (including *Amphuria filiformis* and *Ophiura albida*) and sea potatoes (*Echinocardium cordatum*), and sea-pens such as the slender sea-pen (*Virgularia mirabilis*).

Since the site was recommended, more data for Fulmar MCZ was collected through additional data analysis and site survey in 2012. Ground-truthing confirmed the presence of subtidal mud and subtidal mixed sediments broad-scale habitats in the site and formed the basis for a new modelled habitat map to revise the extent of subtidal sand and subtidal coarse sediment at the

[22] Site description based on: https://jncc.gov.uk/our-work/east-of-gannet-and-montrose-fields-mpa/
[23] Site description based on: https://jncc.gov.uk/our-work/fulmar/, Net Gain (2011)

site[24]. The survey, along with other data sourced confirmed the presence of ocean quahog at the site.

Swallow Sand MCZ[25]

The site is located approximately 100km off the Northumberland coast in the central North Sea and has two broadscale habitats (Subtidal coarse sand, Subtidal sand) and one geological/geomorphological feature (the glacial tunnel valley, Swallow Hole) as its protected features. Depths across the site vary between 50m and 100m, and 150m within Swallow Hole, which is located in the north-west corner of the site. The habitats are characteristic of those found in offshore waters deeper than 30 m, experiencing low tidal stress and constituting a relatively stable habitat that supports a diverse range of marine flora and fauna.

The site has been subject to verification surveys undertaken in 2012[26] and 2014, and monitoring surveys undertaken in 2016 (Curtis *et al.* 2020, Whomersley *et al.* 2020) and 2018 (McIlwaine *et al.* 2020). Data from the 2016 survey of the site (Curtis *et al.* 2020) revealed a more complex distribution of broadscale habitats than expected, with samples predominantly classified as Subtidal sand, Subtidal mud, with some occurrence of Subtidal coarse and mixed sediments. The subtidal mud observed in the centre of the site was interpreted to be associated with a glacial tunnel valley. Multivariate analysis of the infaunal data showed a single broad community across the broadscale habitats, with abundance along a gradient of sediment composition. Epifauna were sparse; the sea-pen, *Pennatula phosphorea* was abundant and was noted to have potential as an indicator of site condition given its likely sensitivity to disturbance. Curtis *et al.* (2020) note that while no habitat or species FOCI are designated for the stie, survey data collected in 2012, 2014 and 2016 indicated the presence of the "Sea-pens and burrowing megafauna" habitat at nine stations, as well as the presence of ocean quahog (*Arctica islandica*).

5.1.2 Assessment

The conservation objectives of relevant sites and information relating to site selection and advice on operations have been considered against the work programme for the areas applied for to determine whether site conservation objectives could be hindered. The results are given in Table 5.2 below. All mandatory control requirements (Section 3.4), are assumed to be in place as a standard for all activities assessed.

Table 5.2: Consideration of potential physical disturbance and drilling effects and relevant site conservation objectives

Faroe-Shetland Sponge Belt MPA[27]
Site Information
Area (ha/km²): 527,800/5,278 **Designated features**: Continental slope, Deep sea sponge aggregations, Marine Geomorphology of the Scottish Deep Ocean Seabed, Offshore subtidal sands and gravels, Submarine Mass Movement, Quaternary of Scotland, Ocean quahog aggregations (*Arctica islandica*) **Conservation objectives**: The Conservation Objective for the Faroe-Shetland Sponge Belt Nature Conservation Marine Protected Area is that the protected features listed below -

[24] https://hub.jncc.gov.uk/assets/91e7f80a-5693-4b8c-8901-11f16e663a12, also see: https://randd.defra.gov.uk/ProjectDetails?ProjectID=18983, https://nora.nerc.ac.uk/id/eprint/510587/
[25] https://jncc.gov.uk/our-work/swallow-sand-mpa/
[26] https://randd.defra.gov.uk/ProjectDetails?ProjectID=18983
[27] https://jncc.gov.uk/our-work/faroe-shetland-sponge-belt-mpa/

- so far as already in favourable condition, remain in such condition; and
- so far as not already in favourable condition, be brought into such condition, and remain in such condition.

With respect to Deep-sea sponge aggregations and Offshore subtidal sands and gravels, this means that—

- Extent is stable or increasing; and
- Structures and functions, quality, and the composition of characteristic biological communities (which includes a reference to the diversity and abundance of marine fauna forming part of or inhabiting each habitat) are such as to ensure they remain in a condition which are healthy and not deteriorating.

Any temporary deterioration in condition is to be disregarded if the habitats are sufficiently healthy and resilient to enable their recovery from such deterioration. Any alteration to the features brought about entirely by natural processes are to be disregarded.

With respect to the Ocean quahog (*Arctica islandica*) aggregations, this means that the quality and quantity of its habitat and the composition of its population are such that they ensure that the population is maintained in numbers which enable it to thrive. Any temporary reduction of numbers is to be disregarded if the population of Ocean quahog is thriving and sufficiently resilient to enable its recovery from such reduction. Any alteration to that feature brought about entirely by natural processes is to be disregarded.

With respect to the Continental slope channels, Iceberg plough marks, Prograding wedges, Slide deposits, Sand wave fields and Sediment wave fields representative of the West Shetland Margin Paleo-Depositional System and West Shetland Margin Contourite Deposits Key Geodiversity Areas, this means that:

- Their extent, component elements and integrity are maintained;
- Their structure and functioning are unimpaired; and
- Their surfaces remain sufficiently unobscured for the purposes of determining whether the points noted above are satisfied.

Any obscuring of the features entirely by natural processes is to be disregarded. Any alteration to the features brought about entirely by natural processes is to be disregarded.

With respect to the area of the Faroe-Shetland Channel Continental slope protected as a large-scale feature, this means that:

- Its extent, distribution and structure is maintained;
- Its function is maintained so as to ensure that it continues to support its characteristic biological communities (which includes a reference to the diversity of any species associated with the large-scale feature) and their use of the site for, but not restricted to, feeding, courtship, spawning, or use as nursery grounds; and
- The processes supporting it are maintained.

Any alteration brought about entirely by natural processes is to be disregarded.

Relevant Blocks with potential for physical disturbance and drilling effects

204/20d, 205/14, 205/1b, 205/2b, 205/3, 205/6, 205/7, 206/2, 208/11, 208/12b, 208/17, 208/18b, 208/26, 213/25, 213/28, 213/29, 213/30, 214/15, 214/21, 214/22, 214/23, 214/24, 214/26, 214/27, 214/28a, 214/29a

Activities associated with the proposed work programmes within the relevant licence areas

Drilling of up to 7 wells involving - siting of rig, drilling discharges

Assessment of effects on site integrity

Rig siting

(**Relevant pressures:** *penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion; introduction or spread of non-indigenous species*)

All of the site's protected habitats and species are considered to be sensitive to the above pressures[28], which are associated with the siting of a drilling rig, though deep sea sponge aggregations are noted in the SACO as being particularly sensitive to disturbance and with likely long recovery times. Due to the water depths across the Blocks screened in, it is likely that a semi-submersible rig would be chosen to undertake any drilling. As noted in Table 2.1, mooring of such rigs may either be by anchoring or dynamic positioning (DP). Anchoring could involve the use of between eight and 12 anchors are deployed radially from the rig, with the anchors (if used) extending out to between 1.5 and 1.8km, affecting an area of up to 0.09km^2. Any individual rig siting would represent a limited impact on the site area (0.002%), and for a number of Blocks screened in to this assessment (205/3, 205/6, 205/14, 208/17, 208/18b, 208/26, 213/30, 214/22, 214/23, 214/26), there is considerable scope for a rig to be sited outside of the site boundaries, avoiding any interaction with the protected features, and for

[28] https://hub.jncc.gov.uk/assets/1422e961-edfb-40e8-b1ad-2eaf67cf21f0#FSSB-5-AdviceOnOperations-v1.0.xlsx

Blocks greater than 1.8km from the site (205/1b, 208/11, 208/12b, 213/25, 213/28, 214/15, 214/21), there would be no direct interaction and related physical impacts. Recovery of the habitats from physical disturbance of the scale associated with rig anchoring is expected to be relatively rapid given the moderate to high energy seabed environment. Site surveys are required to be undertaken before drilling rig placement (for safety and environmental reasons) and the results of such surveys allow for the identification of further mitigation including the re-siting of activities (e.g. wellhead or rig anchor positions) to ensure sensitive seabed surface features are avoided (e.g. sponge or *Arctica* aggregations). Physical disturbance will be small scale, is expected to be temporary, and mitigation is available (e.g. the avoidance of sensitive features) such that it will not have a significant effect on the extent and distribution of the protected features in the longer term. Therefore, the siting of a semi-submersible rig in any of the Blocks listed above will not significantly hinder the site's conservation objectives being achieved.

Management of the spread of non-native species from vessels and rigs is being progressed through international measures, and the risk is limited by the operational range of rigs on the UKCS.

Drilling discharges

(**Relevant pressures:** *abrasion/disturbance of the substrate on the surface of the seabed; habitat structure changes - removal of substratum (extraction*), *contaminants, smothering and siltation rate changes)*

The protected features are sensitive to abrasion/disturbance of the seabed surface, siltation rate changes including smothering, habitat structure changes, removal of substratum (extraction) and contaminant pressures associated with drilling discharges. The SACO notes the presence of drill cuttings in the site around former wells, with some evidence of smothering, and a reduction of sponge abundance including in areas above the level of smothering, noted three years after drilling, within 100m of the well location. It is assumed for the purposes of this assessment that effects from drilling discharges occur within 500m of the well location (Table 2.1), and the SACO indicates changes in sponge abundance in relation to drilling to be even more isolated to within 100m of former well locations. For each well, the maximum spatial footprint within which smothering by drilling discharges may occur (0.8km^2, based on a 500m radius of effect) is small (representing 0.003% of the total site area). The duration of effects is uncertain, and while the SACO refers to effects being observed three years following a well being drilled (Jones *et al.* 2012), this may be too short a duration to consider the permanence of any effect of drilling discharges in the site, particularly given the slow growing nature of sessile megafauna in this region (Vad *et al.* 2018). Vad *et al.* (2019) elucidated effects from a range of anthropogenic activities, both historical and ongoing, within the Faroe-Shetland Channel using spatial eigenfunction analysis, noted that distance to wells, pipelines and the presence of other oil and gas related infrastructure were significant factors affecting megafauna spatial composition, also referring to successive studies of disturbance and smothering related to offshore well drilling (Jones *et al.* 2006, 2007, 2012), and noting the partial recovery 3 and 10 years post-drilling. The study of Jones *et al.* (2012) which considered survey data 10 years following a well being drilled lacked a baseline survey to make comparisons, for example, with the abundance and distribution of sessile fauna, though effects are generally noted to be limited to within 100-250m of the well location. While effects are noted in relation to the drilling of wells and related discharges within the Faroe-Shetland Channel, these are spatially limited, and while effects are likely to be longer lasting than, for example in the shallow southern North Sea, thy are likely to be temporary in nature.

With regards to contaminants, any chemicals used in the drilling of exploration wells would be subject to risk assessment as part of consenting project-specific drilling activities. Those exiting regulatory requirements and controls set out in Section 3.4.1 (also see Appendix 3 of BEIS 2022a) are considered adequate to avoid significant effects on the site, or any effect that would hinder the conservation objectives of the site being achieved.

Cumulative effects

Intra-plan cumulative effects are possible although spatial footprints associated with rig installation and drilling discharges in Blocks 204/20d, 205/14, 205/3, 205/6, 205/7, 206/2, 208/17, 208/18b, 208/26, 213/30, 214/22, 214/23, 214/24, 214/26, 214/27, 214/28a and 214/29a which are entirely or partly within the site, are expected to be localised and temporary, and unlikely to overlap either spatially or temporally. Given the indicative work programmes (Table 5.1), the combined spatial footprint within which physical disturbance and drilling effects could occur (within 500m of the rig/well location for discharges, and up to 1.8km for rig siting) across these Blocks (a worst case scenario of 7 wells based on the number of licences applied for associated with these Blocks) is estimated at 5.6km^2 (0.1% of the site). The localised nature of the disturbance, which is also anticipated to be temporary, is such that the combined effects of licensing all of the Blocks identified to be relevant to the assessment of the Faroe-Shetland Sponge Belt MPA will not significantly hinder the conservation objectives of the site being achieved. Cumulative effects with other relevant plans and projects are considered in Section 5.1.3.

Conclusion
The siting of a rig and related well discharges in Blocks 204/20d, 205/14, 205/1b, 205/2b, 205/3, 205/6, 205/7, 206/2, 208/11, 208/12b, 208/17, 208/18b, 208/26, 213/25, 213/28, 213/29, 213/30, 214/15, 214/21, 214/22, 214/23, 214/24, 214/26, 214/27, 214/28a and 214/29a will not significantly hinder the achievement of the Faroe-Shetland Sponge Belt MPA site conservation objectives.

North-east Faroe-Shetland Channel MPA[29]

Site Information

Area (ha/km²): 2,368,200/23,682
Designated features: Quaternary of Scotland, Submarine Mass Movement, Cenozoic Structures of the Atlantic Margin, Continental slope, Deep sea sponge aggregations, Marine Geomorphology of the Scottish Deep Ocean Seabed, Offshore deep sea muds, Offshore subtidal sands and gravels.

Conservation objectives:
The conservation objectives for the North-East Faroe-Shetland Channel Nature Conservation Marine Protected Area (NCMPA) are that the protected features:

- so far as already in favourable condition, remain in such condition; and
- so far as not already in favourable condition, be brought into such condition, and remain in such condition.

With respect to the Deep-sea sponge aggregations, Offshore deep-sea muds and Offshore subtidal sands and gravels, this means that:

- Extent is stable or increasing; and
- Structures and functions, quality, and the composition of characteristic biological communities (which includes a reference to the diversity and abundance of species forming part of or living within each habitat) are such as to ensure that they remain in a condition which is healthy and not deteriorating.

Any temporary deterioration in condition is to be disregarded if the habitats are sufficiently healthy and resilient to enable their recovery from such deterioration. Any alteration to the features brought about entirely by natural processes is to be disregarded.

With respect to the Continental slope, this means that:

- Its extent, distribution and structure is maintained;
- Its function is maintained so as to ensure that it continues to support its characteristic biological communities (which includes a reference to the diversity of any species associated with the large-scale feature) and their use of the site for, but not restricted to, feeding, courtship, spawning, or use as nursery grounds; and
- the processes supporting it are maintained.

Any alteration brought about entirely by natural processes is to be disregarded.

With respect to the Prograding wedge, Slide deposits, Contourite sand/silt and Pilot whale diapirs representative of the West Shetland Margin Paleo-Depositional System, North Sea Fan, Miller Slide and Pilot Whale Diapirs Key Geodiversity Areas this means that:

- Their extent, component elements and integrity are maintained;
- Their structure and functioning are unimpaired; and
- Their surfaces remain sufficiently unobscured for the purposes of determining whether the above criteria are satisfied.

Any obscuring of the features entirely by natural processes is to be disregarded. Any alteration to the features brought about entirely by natural processes is to be disregarded.

Relevant Blocks with potential for physical disturbance and drilling effects

208/1, 208/11, 208/12b, 208/13b, 208/17, 208/18b, 208/6, 214/10, 214/13b, 214/14a, 214/15, 214/4a, 214/5, 214/8, 214/9

Activities associated with the proposed work programmes within the relevant licence areas

Drilling of 3 wells involving - siting of rig, drilling discharges

Assessment of effects on site integrity

Rig siting
(**Relevant pressures:** *penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion; introduction or spread of non-indigenous species*)

[29] https://jncc.gov.uk/our-work/north-east-faroe-shetland-channel-mpa/

All of the site's protected habitats and species are considered to be sensitive to the above pressures[30], which are associated with the siting of a drilling rig. Due to the water depths across the Blocks screened in, it is likely that a semi-submersible rig would be chosen to undertake any drilling. As noted in Table 2.1, mooring of such rigs may either be by anchoring or dynamic positioning (DP). Anchoring could involve the use of between eight and 12 anchors are deployed radially from the rig, with the anchors (if used) extending out to between 1.5 and 1.8km, affecting an area of up to 0.09km^2. Any individual rig siting would represent a limited impact on the site area (0.0004%) and for a number of Blocks screened in to this assessment (214/9, 214/14a, 214/15, 208/11, 208/12b, 208/13b), there is considerable scope for a rig to be sited outside of the site boundaries, avoiding any interaction with the protected features, and for Blocks greater than 1.8km from the site (208/17, 208/18b, 214/8, 214/13b), there would be no direct interaction and related physical impacts. Additionally, the Blocks applied for which are relevant to this site are some distance from the areas of deep sea sponge aggregations, and the Pilot Whale Diapers[31], and effects on these features are considered to be unlikely. Recovery from physical disturbance of the scale associated with rig anchoring is expected to be relatively rapid given the moderate to high energy seabed environment. Site surveys are required to be undertaken before drilling rig placement (for safety and environmental reasons) and the results of such surveys allow for the identification of further mitigation including the re-siting of activities (e.g. wellhead or rig anchor positions) to ensure sensitive seabed surface features are avoided (e.g. sponge aggregations). Physical disturbance will be small scale, is expected to be temporary, and mitigation is available (e.g. the avoidance of sensitive features) such that it will not have a significant effect on the extent and distribution of the protected features in the longer term. Therefore, the siting of a semi-submersible rig in any of the Blocks listed above will not significantly hinder the site's conservation objectives being achieved.

Management of the spread of non-native species from vessels and rigs is being progressed through international measures, and the risk is limited by the operational range of rigs on the UKCS.

Drilling discharges
(**Relevant pressures:** *abrasion/disturbance of the substrate on the surface of the seabed; habitat structure changes - removal of substratum (extraction*), *contaminants, smothering and siltation rate changes)*

The protected features are sensitive to abrasion/disturbance of the seabed surface, siltation rate changes including smothering, habitat structure changes, removal of substratum (extraction) and contaminant pressures associated with drilling discharges. The SACO notes the presence of drill cuttings in the site around former wells, with some evidence of smothering, and a reduction of sponge abundance including in areas above the level of smothering, noted three years after drilling, within 100m of the well location; note that only five exploration wells have been drilled within this site. It is assumed for the purposes of this assessment that effects from drilling discharges occur within 500m of the well location (Table 2.1), and the SACO indicates changes in sponge abundance in relation to drilling to be even more isolated to within 100m of former well locations, noting that the Blocks applied for are some distance from the main areas of sponge aggregations. For each well, the maximum spatial footprint within which smothering by drilling discharges may occur (0.8km^2, based on a 500m radius of effect) is small (representing 0.003% of the total site area). The duration of effects is uncertain, and while the SACO refers to effects being observed three years following a well being drilled (Jones *et al.* 2012), this may be too short a duration to consider the permanence of any effect of drilling discharges in the site, particularly given the slow growing nature of sessile megafauna in this region (Vad *et al.* 2018). While effects are noted in relation to the drilling of wells and related discharges within the Faroe-Shetland Channel, these are spatially limited, and while effects are likely to be longer lasting than, for example in the shallow southern North Sea, thy are likely to be temporary in nature.

With regards to contaminants, any chemicals used in the drilling of exploration wells would be subject to risk assessment as part of consenting project-specific drilling activities. Those exiting regulatory requirements and controls set out in Section 3.4.1 (also see Appendix 3 of BEIS 2022a) are considered adequate to avoid significant effects on the site, or any effect that would hinder the conservation objectives of the site being achieved.

Cumulative effects
Intra-plan cumulative effects are possible although spatial footprints associated with rig installation and drilling discharges in Blocks 208/1, 208/11, 208/12b, 208/13b, 208/6, 214/10, 214/14a, 214/15, 214/4a, 214/5 and 214/9 which are entirely or partly within the site, are expected to be localised and temporary, and unlikely to overlap either spatially or temporally. Given the indicative work programmes (Table 5.1), the combined spatial footprint within which physical disturbance and drilling effects could occur (within 500m of the rig/well location for discharges, and up to 1.8km for rig siting) across these Blocks (a worst case scenario of three wells based on

[30] https://hub.jncc.gov.uk/assets/91754596-aa1e-4a53-b45d-aa92806eb61c#NEFSC-5-AoOWorkbook-v1.0.xlsx
[31] https://data.jncc.gov.uk/data/599143aa-d0c8-405c-9665-2973e581cdd0/NEFSC-2-DataConfidenceAssessment-v5-0.pdf, also see Gallyot *et al.* (2022).

the number of licences applied for associated with these Blocks) is estimated at 2.4km^2 (0.01% of the site). The localised and nature of the disturbance, which is also anticipated to be temporary, is such that the combined effects of licensing all of the Blocks identified to be relevant to the assessment of the Faroe-Shetland Sponge Belt MPA will not significantly hinder the conservation objectives of the site being achieved. Cumulative effects with other relevant plans and projects are considered in Section 5.1.3.

Conclusion
The siting of a rig and related well discharges in Blocks 208/1, 208/11, 208/12b, 208/13b, 208/17, 208/18b, 208/6, 214/10, 214/13b, 214/14a, 214/15, 214/4a, 214/5, 214/8 and 214/9 will not significantly hinder the achievement of the North-east Faroe-Shetland Channel MPA site conservation objectives.

East of Gannet and Montrose Fields MPA[32]

Site Information

Area (ha/km^2): 183,900/1,839
Designated features: Offshore subtidal sands and gravels, Offshore deep sea muds, Ocean quahog aggregations (*Arctica islandica*)

Conservation objectives:
The conservation objectives for the East of Gannet and Montrose Fields Nature Conservation Marine Protected Area (NCMPA) are that the protected features:

- so far as already in favourable condition, remain in such condition; and
- so far as not already in favourable condition, be brought into such condition, and remain in such condition.

With respect to the Offshore deep-sea muds within the NCMPA, this means that:

- extent is stable or increasing; and
- structures and functions, quality, and the composition of characteristic biological communities (which includes a reference to the diversity and abundance of species forming part of or living within the habitat) are such as to ensure that they remain in a condition which is healthy and not deteriorating.

Any temporary deterioration in condition is to be disregarded if the habitat is sufficiently healthy and resilient to enable its recovery from such deterioration. Any alteration to that feature brought about entirely by natural processes is to be disregarded.

With respect to the Ocean quahog aggregations (including supporting sedimentary habitats) within the NCMPA, this means that the quality and quantity of its habitat and the composition of its population in terms of number, age and sex ratio are such as to ensure that the population is maintained in numbers which enable it to thrive. Any temporary reduction of numbers is to be disregarded if the population is sufficiently thriving and resilient to enable its recovery. Any alteration to that feature brought about entirely by natural processes is to be disregarded.

Relevant Blocks with potential for physical disturbance and drilling effects

21/25c, 21/30g, 22/12b, 22/21d, 22/23c, 22/24f, 22/26e, 22/27, 22/28b, 22/29b, 29/1c, 29/2a, 29/3b, 29/4b

Activities associated with the proposed work programmes within the relevant licence areas

Drilling of up to 8 wells involving - siting of rig, drilling discharges

Assessment of effects on site integrity

Rig siting
(**Relevant pressures:** *penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion, introduction or spread of non-indigenous species*)

All of the site's protected habitats and species are considered to be sensitive to the above pressures[33], which are associated with the siting of a drilling rig. Water depths across the Blocks screened in is variable, however is generally less than 100m such that either a semi-submersible rig or jack-up rig could be used to drill a well. As noted in Table 2.1, mooring of such rigs may either be by anchoring or dynamic positioning (DP). Anchoring could involve the use of between eight and 12 anchors are deployed radially from the rig, with the anchors (if used) extending out to between 1.5 and 1.8km, affecting an area of up to 0.09km^2. For a jack-up rig, the area of disturbance is largely associated with the spud cans used the stabilise the rig on the seabed, and the overall area of impact assumed to be larger than a semisubmersible at 0.8km^2. Any individual rig siting would represent a limited impact on the site area of 0.005% and 0.04% of the site area for a semi-submersible or jack-up rig

[32] https://jncc.gov.uk/our-work/east-of-gannet-and-montrose-fields-mpa/
[33] https://hub.jncc.gov.uk/assets/7d1e751a-e082-405b-aad9-51eeaf53dd67#EGM-5-AdviceOnOperations-v1.0.xlsx

respectively. For a number of Blocks screened in to this assessment (21/30g, 22/29b, 29/2a, 29/3b, 29/4b), there is considerable scope for a rig to be sited outside of the site boundaries, avoiding any interaction with the protected features, and for Blocks greater than 1.8km from the site (22/24f, 29/1c), there would be no direct interaction and related physical impacts. Site surveys are required to be undertaken before drilling rig placement (for safety and environmental reasons) and the results of such surveys allow for the identification of further mitigation including the re-siting of activities (e.g. wellhead, spud can, or rig anchor positions) to ensure sensitive seabed surface features are avoided (e.g. *Arctica* aggregations). Physical disturbance will be small scale, is expected to be temporary, and mitigation is available (e.g. the avoidance of sensitive features) such that it will not have a significant effect on the extent and distribution of the protected features in the longer term. Therefore, the siting of a rig in any of the Blocks listed above will not significantly hinder the site's conservation objectives being achieved.

Management of the spread of non-native species from vessels and rigs is being progressed through international measures, and the risk is limited by the operational range of rigs on the UKCS.

Drilling discharges
(**Relevant pressures:** *abrasion/disturbance of the substrate on the surface of the seabed; habitat structure changes - removal of substratum (extraction*), *contaminants, smothering and siltation rate changes)*

The protected habitats and species of the site are sensitive to abrasion/disturbance of the seabed surface, siltation rate changes including smothering, contaminants (e.g. hydrocarbons) and habitat structure changes, removal of substratum (extraction) pressures associated with drilling discharges. Any discharge from exploration well drilling would be subject to risk assessment as part of existing regulatory controls (see Section 3.4.1). It is assumed that effects relating to drilling discharges occur within 500m of the well location (Table 2.2). Some of the Blocks applied for have substantial areas outside of the site within which rig siting may be possible or are entirely outside of the site (21/30g, 22/24f, 22/29b, 29/1c, 29/2a, 29/3b, 29/4b), such that discharges associated with any well would be unlikely to impact the site's protected features. For each well, the maximum spatial footprint within which smothering by drilling discharges may occur (0.8km^2) is small (representing 0.09% of the total site area). As the feature lies in a relatively low energy environment, drill cuttings may not be removed by currents, and result in localised smothering, with a likely temporary effect. The small scale and expected temporary nature of potential smothering, as well as mandatory control requirements with respect to drilling chemical use and discharge (Section 3.4.1), are such that the achievement of the site conservation objectives will not be significantly hindered.

Cumulative effects
Intra-plan cumulative effects are possible although spatial footprints associated with rig installation and drilling discharges in Blocks 21/25c, 21/30g, 22/12b, 22/21d, 22/23c, 22/26e, 22/27, 22/28b, 22/29b, 29/2a, 29/3b and 29/4b which are entirely or partly within the site, are localised and expected to be temporary, and unlikely to overlap either spatially or temporally. Given the indicative work programmes Table 5.1, the combined spatial footprint within which physical disturbance and drilling effects could occur (within 500m of the rig/well location for discharges, and up to 1.8km for rig siting) across these Blocks (a worst case scenario of eight wells based on the licences associated with these blocks) is estimated at 6.4km^2 (0.35% of the site). The localised nature of the disturbance, which is also anticipated to be temporary, is such that the combined effects of licensing all of the Blocks identified to be relevant to the assessment of the East of Gannet and Montrose Fields MPA will not significantly hinder the conservation objectives of the site being achieved. Cumulative effects with other relevant plans and projects are considered in Section 5.1.3.

Conclusion
The siting of a rig and related well discharges in Blocks 21/25c, 21/30g, 22/12b, 22/21d, 22/23c, 22/24f, 22/26e, 22/27, 22/28b, 22/29b, 29/1c, 29/2a, 29/3b and 29/4b will not significantly hinder the achievement of the East of Gannet and Montrose Fields MPA site conservation objectives.

Fulmar MCZ[34]

Site Information

Area (ha/km^2): 243,700/2,437
Designated features: Subtidal sand, Subtidal mud, Subtidal mixed sediments, Ocean quahog (*Arctica islandica*)

Conservation objectives:
The conservation objectives for the Fulmar MCZ are that the protected features:

[34] https://jncc.gov.uk/our-work/fulmar/

- so far as already in favourable condition, remain in such condition; and
- so far as not already in favourable condition, be brought into such condition, and remain in such condition.

With respect to Subtidal mixed sediments, Subtidal mud and Subtidal sand within the zone, this means that:

- extent is stable or increasing; and
- structures and functions, quality, and the composition of characteristic biological communities (which includes a reference to the diversity and abundance of species forming part of or living within the habitat) are such as to ensure that they remain in a condition which is healthy and not deteriorating.

Any temporary deterioration in condition is to be disregarded if the habitat is sufficiently healthy and resilient to enable its recovery. Any alteration to that feature brought about entirely by natural processes is to be disregarded.

With respect to the Ocean quahog (*Arctica islandica*) within the zone, this means that the quality and quantity of its habitat and the composition of its population in terms of number, age and sex ratio are such as to ensure that the population is maintained in numbers which enable it to thrive. Any temporary reduction of numbers is to be disregarded if the population is sufficiently thriving and resilient to enable its recovery. Any alteration to that feature brought about entirely by natural processes is to be disregarded.

Relevant Blocks with potential for physical disturbance and drilling effects

29/15, 29/19, 30/11c, 30/13b, 30/16g, 30/6c

Activities associated with the proposed work programmes within the relevant licence areas

Drilling of wells involving - siting of rig, drilling discharges

Assessment of effects on site integrity

Rig siting

(**Relevant pressures:** *penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion, introduction or spread of non-indigenous species*)

All or substantial parts of Blocks 29/15, 30/11c and 30/16g overlap the Fulmar MCZ, with the remaining Blocks screened in (29/19, 30/6c, 30/13b) entirely outside of the site boundaries. The advice on operations for the site indicate that all of the site features are sensitive to the above pressures, which are relevant to the siting of drilling rigs and related exploration drilling. For those Blocks with no spatial overlap with the site, direct physical disturbance effects will not occur, and siting a rig within these will not hinder the conservation objectives of the site being achieved. Blocks 29/15 and 30/11c substantially overlap the site such that there may be limited scope to avoid interactions, and Block 30/16g is entirely within the site. Should a rig be located within the site, the maximum spatial footprint of the penetration and/or disturbance pressure associated with jack-up rig siting is small (0.8km^2, see Table 2.1) compared to the site (covering 0.03%). There may be a requirement for rig stabilisation depending on local seabed conditions. In soft sediments, deposited rock may cover existing sediments resulting in a physical change (to another seabed type), and the protected features which have the potential to be impacted by rig siting are considered to be sensitive to this pressure, which assumes a permanent change of habitat. The SACO only refers to oil and gas related activity with reference to ocean quahog (*Arctica islandica*) and its supporting habitat, noting that drill cuttings and rock placement have the potential to reduce or alter the extent of and distribution of the species or habitat, and noting some historical and ongoing pressures from such activities (see Section 5.2.3). The SACO indicates that activities should look to minimise as far as practicable, a change in substrata that would result in a change in the natural extent of the ocean quahog supporting habitat. Applicants for consents related to the drilling of wells would be expected to minimise the volume of rock required for rig stabilisation.

The placement of a rig within the site, should this occur, would result in temporary and spatially limited effects, and should rig stabilisation be required, any changes to the distribution and extent of habitats within the site would be highly limited (with any rock used to be the minimum required, as per the SACO), or could be avoided should retrievably rig stabilisation methods be used. It is not considered likely that the temporary placement of a rig within the site will affect the extent, structure, or function of any of the features of the Fulmar MCZ in a way in which the achievement of the conservation objectives of the site will be significantly hindered.

Management of the spread of non-native species from vessels and rigs is being progressed through international measures, and the risk is limited by the operational range of rigs on the UKCS.

Drilling discharges

(**Relevant pressures:** *abrasion/disturbance of the substrate on the surface of the seabed; habitat structure changes - removal of substratum (extraction*), *contaminants, smothering and siltation rate changes)*

The protected habitats and species of the site are sensitive to abrasion/disturbance of the seabed surface, siltation rate changes including smothering, contaminants (e.g. hydrocarbons) and habitat structure changes, removal of substratum (extraction) pressures associated with drilling discharges. Any discharge from exploration well drilling would be subject to risk assessment as part of existing regulatory controls (see Section 3.4.1). It is assumed that effects relating to drilling discharges occur within 500m of the well location (Table 2.1). Some of the Blocks applied for are entirely outside of the site (29/19, 30/6c, 30/13b), such that discharges associated with any well are unlikely to impact the protected features. For those Blocks that substantially overlap the site or are entirely within its boundaries, the maximum spatial footprint within which smothering by drilling discharges may occur (0.8km^2) is small (representing 0.03% of the total site area). As the feature lies in a relatively low energy environment, drill cuttings may not be removed by currents, and result in localised smothering, with a likely temporary effects. The small scale and expected temporary nature of potential smothering, as well as mandatory control requirements with respect to drilling chemical use and discharge (Section 3.4.1), are such that the achievement of the site conservation objectives will not be significantly hindered.

Cumulative effects
Intra-plan cumulative effects are possible although spatial footprints associated with rig installation and drilling discharges in the Blocks screened in are localised and are expected to be temporary (other than any rig stabilisation using rock), and unlikely to overlap either spatially or temporally. A single licence application covers those Blocks applied for which are located within the Fulmar MCZ, or within 500m of it (29/15, 30/11c, 30/16g), for which there is the potential for only one well to be drilled. Therefore, the scale of effect from licensing these three Blocks, should a well be located within the site, would be the same as that referred to above (i.e. up to 0.8km^2). It is therefore concluded that the combined effects of licensing these Blocks will not significantly hinder the site's conservation objectives. Section 5.2.3 provides a consideration of potential cumulative effects with other projects.

Conclusion
The siting of a rig and related discharges in Blocks 29/15, 29/19, 30/11c, 30/13b, 30/16g and 30/6c will not hinder the achievement of the Cromer Shoal Chalk Beds MCZ site conservation objectives.

Swallow Sand MCZ[35]

Site Information

Area (ha/km^2): 474,600/4,746
Designated features: Subtidal coarse sediment, Subtidal sand, North Sea glacial tunnel valley (Swallow Hole)

Conservation objectives:
The Conservation Objective for the Swallow Sand Marine Conservation Zone is that the protected features:

- so far as already in favourable condition, remain in such condition; and
- so far as not already in favourable condition, be brought into such condition, and remain in such condition.

With respect to Subtidal coarse sediment and Subtidal sand within the Zone, means that:

- Extent is stable or increasing; and
- Structures and functions, quality, and the composition of characteristic biological communities (which includes a reference to the diversity and abundance of species forming part of or inhabiting each habitat) are such as to ensure that they remain in a condition which is healthy and not deteriorating.

Any temporary deterioration in condition is to be disregarded if the habitats are sufficiently healthy and resilient to enable its recovery. Any alteration to the features brought about entirely by natural processes is to be disregarded.

With respect to the North Sea glacial tunnel valley (Swallow Hole) within the Zone, means that:

i. Its extent, component elements and integrity are maintained;
ii. Its structure and functioning are unimpaired; and
iii. Its surface remains sufficiently unobscured for the purposes of determining whether the conditions in paragraphs (i) and (ii) are satisfied.

Any obscurement of that feature brought about entirely by natural processes is to be disregarded. Any alteration to that feature brought about entirely by natural processes is to be disregarded.

[35] https://jncc.gov.uk/our-work/swallow-sand-mpa/

Relevant Blocks with potential for physical disturbance and drilling effects
29/27, 29/28, 36/14, 36/15, 36/19, 36/20, 37/11, 37/16
Activities associated with the proposed work programmes within the relevant licence areas
Drilling of up to 2 wells involving - siting of rig, drilling discharges
Assessment of effects on site integrity

Rig siting
(**Relevant pressures:** *penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion, introduction or spread of non-indigenous species*)

Of the Blocks identified to be relevant to the assessment of Swallow Sand MCZ, three are located entirely within the site (36/14, 36/15, 37/11), with the remaining five being entirely outside the site, but immediately adjoining it. The advice on operations notes that the site features are sensitive to the above pressure of, penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion, and for those Blocks entirely within the site, due to the broadscale nature of the protected features, it is unlikely that rig site selection would be a means to avoid the features of the site. Should a rig be located within the site, the maximum spatial footprint of the penetration and/or disturbance pressure associated with jack-up rig siting is small (0.8km^2, see Table 2.1) relative to the size of the site (covering 0.02%), though the lower energy environment likely to be present across the site, relative to the shallower southern North Sea, is likely to mean that recovery takes longer. For those Blocks identified to be relevant to the assessment of this site, there will be no direct impacts on the site, and in view of the distance from a rig within which effects are predicted to occur (500m) there is considerable scope to avoid all potential interaction through rig site selection. While there will be impacts from a rig being located within the site, these will be temporary, and will not significantly hinder the site conservation objectives being achieved.

There may be a requirement for rig stabilisation depending on local seabed conditions. In soft sediments, deposited rock may cover existing sediments resulting in a physical change (to another seabed type), and the protected features which have the potential to be impacted by rig siting are considered to be sensitive to this pressure, which assumes a permanent change of habitat. The potential change of sediment/seabed type from rig stabilisation is small (estimated area of 0.001-0.004km^2 per rig siting, see Table 2.1) relative to the size of the site (0.00008%). It is considered that any change to the extent and distribution of the broadscale habitats protected by the site would be small, should rig stabilisation be required, and it would not significantly hinder the site conservation objectives being achieved. Applicants for consents related to the drilling of wells would be expected to minimise the volume of rock required for rig stabilisation.

The Swallow Hole glacial tunnel valleys are located in the north west corner of the site, with such features extending beyond the site boundaries. None of the Blocks applied for are within this feature, or within 500m of the features, and it is not considered possible that rig siting could significantly hinder the site conservation objectives being achieved in relation this feature.

Management of the spread of non-native species from vessels and rigs is being progressed through international measures, and the risk is limited by the operational range of rigs on the UKCS.

Drilling discharges
(**Relevant pressures:** *abrasion/disturbance of the substrate on the surface of the seabed; habitat structure changes - removal of substratum (extraction*), *contaminants, smothering and siltation rate changes)*

The protected habitats of the site are sensitive to abrasion/disturbance of the seabed surface, siltation rate changes including smothering, contaminants (e.g. hydrocarbons) and habitat structure changes, removal of substratum (extraction) pressures associated with drilling discharges. Any discharge from exploration well drilling would be subject to risk assessment as part of existing regulatory controls (see Section 3.4.1). It is assumed that effects relating to drilling discharges occur within 500m of the well location (Table 2.1). Some of the Blocks applied for are entirely outside of the site (29/27, 29/28, 36/19, 36/20, 37/16), such that discharges associated with any well are unlikely to impact the protected features. For those Blocks that are within the site, the maximum spatial footprint within which smothering by drilling discharges may occur (0.8km^2) is small (representing 0.017% of the total site area). As the feature lies in a relatively low energy environment, drill cuttings may not be removed by currents, and result in localised smothering, with a likely temporary effects (see Section 4.4 of BEIS 2022b). The small scale and expected temporary nature of potential smothering, as well as mandatory control requirements with respect to drilling chemical use and discharge (Section 3.4.1), are such that the achievement of the site conservation objectives will not be significantly hindered.

Cumulative effects

Intra-plan cumulative effects are possible although spatial footprints associated with rig installation and drilling discharges in the Blocks screened in are localised and are expected to be temporary (other than any rig stabilisation using rock), and unlikely to overlap either spatially or temporally. Given the indicative work programmes, the combined spatial footprint within which physical disturbance and drilling effects could occur (within 500m of the rig/well location) across the Blocks (a worst case scenario of two wells) is estimated at 1.6km^2 (0.03% of the site). With regards to rig stabilisation, should all two wells be drilled within the site, this could cover an area of 0.008km^2 or 0.0002% of the site area. The small scale and anticipated temporary nature of the disturbance are such that it is concluded that combined effects of Blocks licensing will not significantly hinder the site's conservation objectives. Section 5.2.3 provides a consideration of potential cumulative effects with other projects.

Conclusion
The siting of a rig and related discharges in Blocks 29/27, 29/28, 36/14, 36/15, 36/19, 36/20, 37/11 and 37/16 will not hinder the achievement of the Swallow Sand MCZ site conservation objectives.

5.1.3 Cumulative effects

There are a number of potential interactions between activities that may follow licensing and those existing or planned activities, for instance in relation to renewable energy, offshore oil and gas and gas storage, fishing, and aggregate extraction. These activities are subject to individual permitting or consenting mechanisms or are otherwise managed at a national level. Interactions have been identified on the basis of the nature and location of existing or proposed activities and spatial datasets in a Geographic Information System (GIS). Projects relevant to this in-combination effects assessment, along with their status and relevant sites are tabulated in Table 5.3.

The relevant Blocks are located in Scottish waters and therefore the Scottish National Marine Plan policies, adopted in March 2015, are relevant to the management of oil and gas and other offshore activities. With regards to the co-existence of activities, policies within the Scottish National Marine Plan include GEN4 Co-existence, "*Proposals which enable coexistence with other development sectors and activities within the Scottish marine area are encouraged in planning and decision making processes, when consistent with policies and objectives of this Plan*", and more specifically, OIL&GAS3, which states "*Supporting marine and coastal infrastructure for oil and gas developments, including for storage, should utilise the minimum space needed for activity and should take into account environmental and socio-economic constraints*".

Table 5.3: Projects relevant to the cumulative effects assessment for the West of Shetland, northern and central North Sea

Relevant project	Project summary	Project status	Relevant sites[1]
INTOG Area E-a	The INTOG E-a area of search covered the East of Gannet and Montrose Fields MPA, and all Blocks screened in for assessment against this site. A Targeted Oil & Gas (TOG) project for a 1.35GW floating offshore wind development has been proposed in the area by Flotation Energy, which also overlaps the MPA and some of the Blocks applied for.	Pre-planning	East of Gannet and Montrose Fields MPA
Oil and gas field infrastructure	A number of fields are relevant to the West of Shetland area, including Glenlivet, Laggan, Tormore, Foinaven and Schiehallion. Due to water depths across the area, there are no fixed surface installations associated with these fields.	In-production	Faroe Shetland Sponge Belt MPA

Relevant project	Project summary	Project status	Relevant sites[1]
	The proposed Rosebank project is located in Blocks 213/26b, 213/27a, 205/1a and 205/2a. The project has the drilling of subsea wells, connected by flowlines to a redeployed FPSO, with gas to be exported via a new 85km pipeline to the existing West of Shetland Pipeline System, and oil to be exported by tanker.	Awaiting consent decision	
	A number of fields are relevant to the central North Sea area, including Gannet, Montrose, Arbroath, Godwin, Shaw, Arkwright and Madoes. With the exception of Arbroath, Montrose and Gannet which have fixed surface installations, the fields are produced by subsea tie-backs. In addition to these fields and related infrastructure, a number of pipelines traverse the site, including the 36" CATS gas pipeline and related export pipelines from the Stella and Culzean fields, and the Langeled pipeline.	In-production	East of Gannet and Montrose Fields MPA
North Sea Link interconnector	A 1,400MW interconnector stretching between Blyth in the UK and Kvilldal in Norway. The interconnector traverses the MPA, crossing Blocks 22/28b, 22/29b and 29/3b.	In operation	East of Gannet and Montrose Fields MPA
Oil field infrastructure	Includes producing oil fields (Clyde, Orion) or those which have ceased production and are subject to decommissioning.	In operation	Fulmar MCZ

Notes: [1] those sites considered to be relevant to 33rd round exploration activities.

Figure 5.1: Location of blocks applied for in relation to other projects West of Shetland

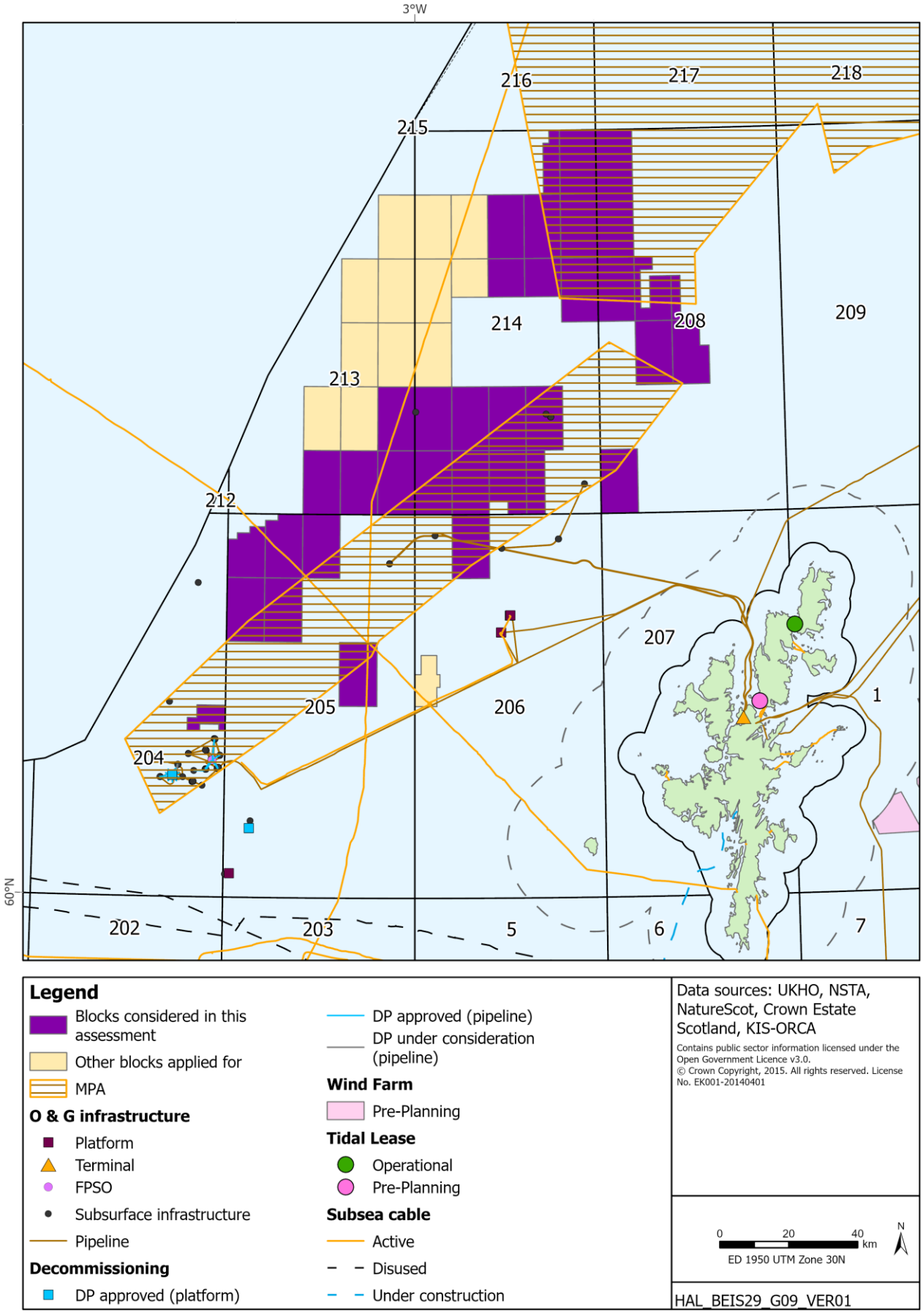
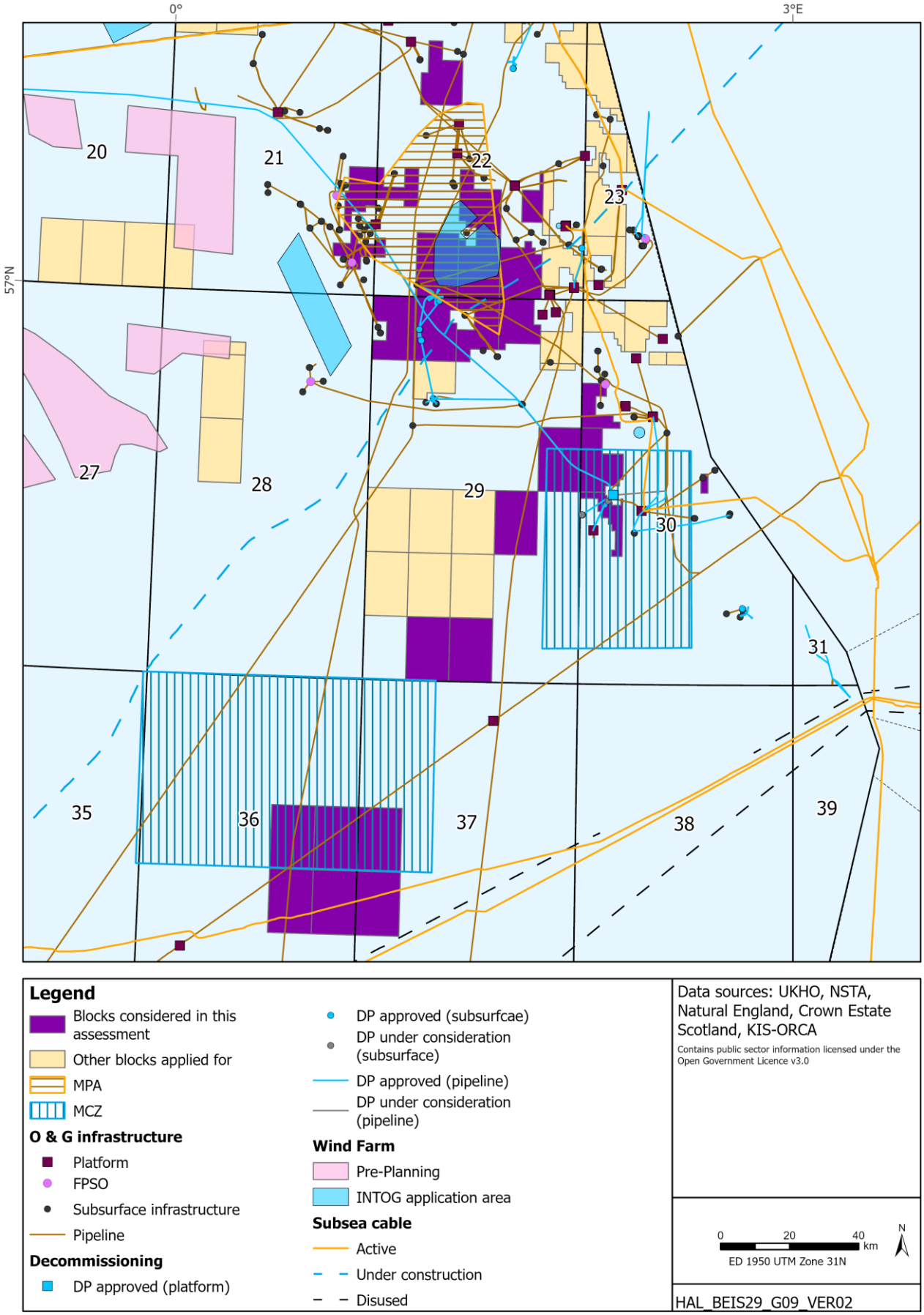


Figure 5.2: Location of blocks applied for in relation to other projects in the central North Sea



Physical disturbance and drilling effects

The features protected by Faroe-Shetland Sponge Belf MPA, North-East Faroe Shetland Channel MPA and East of Gannet and Montrose Fields MPA are benthic habitats, and are therefore only considered to be sensitive to those physical effects related to the work programmes for the relevant Blocks listed in Section 4 and which have already been assessed in relation to the relevant sites in Section 5.1.2. The conclusions of that section are considered here in the context of those relevant projects identified in Table 5.3 above.

There has been limited exploration activity to date in the North-east Faroe-Shetland Channel MPA, with only six exploration wells drilled across the site in years ranging between 1999 and 2013. No other energy activities (e.g. offshore wind) have been proposed in the site. Innovation and Targeted Oil and Gas Decarbonisation (INTOG)[36] area WoS-a is located immediately adjacent to the site, but no projects were proposed in the area through the leasing round[37]. The SACO for the site indicates that demersal trawling and static gear use occur within the area of deep-sea sponge aggregations, which affects their abundance through mortality, with aggregations potentially having a long recovery time, and is the only feature of the site in unfavourable condition. While there is the potential for a rig to be sited within the North-East Faroe-Shetland Channel MPA associated with those Blocks identified in Section 5.1.2, based on the map of known distributions of features within the site, the Blocks assessed are distant from the areas of deep sea sponge aggregations[38] and effects on that feature, in combination with other activities in the area, are not considered to be likely. Similarly, the Blocks are also distant from the Pilot Whale Diapers that make up part of the geodiversity feature. For the remaining site features, rig siting is not expected to act cumulatively with other activities such that achieving the conservation objectives of the North-East Faroe-Shetland Channel MPA will be significantly hindered.

Oil and gas fields and related infrastructure (Table 5.3) are located within the Faroe-Shetland Sponge Belt MPA and are closely associated with a number of Blocks which were subject to assessment in Section 5.1.2 (Figure 5.1). The Foinaven field ceased production in 2021 and the Floating Production, Storage and Offloading (FPSO) vessel associated with the field has been removed, with the current operator, BP, looking at potential options to redevelop the field. While the FPSO formerly associated with the Schiehallion and Loyal fields was decommissioned in 2014 this was replaced in 2016 with the FPSO, *Glen Lyon*, with production recommencing in 2017. The footprint of the infrastructure within the site is small relative to the size of the site, and water depths in the area preclude the use of large fixed infrastructure connected to the seabed; the Laggan and Tormore gas field infrastructure is entirely subsea, with production routed to a gas processing plant on Shetland. The potential effects of cuttings piles were discussed in Section 5.1.2, and while exploration in this area is less intense than in the North Sea, a relatively high number of wells have been drilled across the site, and in particular in the south west where the Foinaven, Schiehallion and Loyal fields are located. The proposed Rosebank project is located to the north of the Faroe-Shetland Sponge Belt MPA and immediately to the north and west of blocks subject to this assessment (e.g. 205/1b, 205/2b and 213/28). While the development is located some distance from the MPA, the Environmental Statement associated with the project indicates that 29km of its associated gas

[36] https://marine.gov.scot/data/sectoral-marine-plan-offshore-wind-innovation-and-targeted-oil-and-gas-decarbonisation-intog
[37] https://www.crownestatescotland.com/news/intog-13-projects-selected-to-support-green-innovation-and-help-decarbonise-north-sea
[38] https://data.jncc.gov.uk/data/599143aa-d0c8-405c-9665-2973e581cdd0/NEFSC-2-DataConfidenceAssessment-v5-0.pdf, also see Gallyot *et al.* (2022).

export pipeline passes through the site, with a worst case of 19km of pipeline requiring some form of protection (burial, rock placement)[39]; it was concluded in the Environmental Statement that there was no significant risk to the conservation objectives of the site being achieved.

In addition to oil and gas related activity, the SACO notes that demersal trawling and static gear are used within the site, including across areas of deep sea sponge aggregations. A number of Blocks applied for also coincide with these areas[40] (205/14, 206/2, 208/26, 208/17, 214/28a, 214/29a). Site surveys are required to be undertaken before drilling rig placement (for safety and environmental reasons) and the results of such surveys allow for the identification of further mitigation including the re-siting of activities (e.g. wellhead or rig anchor positions) to ensure sensitive seabed surface features are avoided. Consent for drilling activities will be subject to further assessment. There is the potential for further drilling discharges to act cumulatively with former and ongoing drilling activity within the site, however, the limited spatial extent of effect relative to the large site, and the potential for recovery as discussed in Section 5.1.2, are such that it is concluded that the licensing of Blocks 208/1, 208/11, 208/12b, 208/13b, 208/17, 208/18b, 208/6, 214/10, 214/13b, 214/14a, 214/15, 214/4a, 214/5, 214/8 and 214/9 will not significantly hinder the conservation objectives of the site.

The East of Gannet and Montrose Fields MPA and all of the Blocks screened into the assessment for that site are within what was INTOG Area E-a. One of the aims of the INTOG project is to support offshore wind projects which could help decarbonise offshore oil and gas production, and one such project within Area E-a has been proposed for this purpose. The 1.35GW project proposed by Flotation Energy is located within the East of Gannet and Montrose Fields MPA. The project was offered an exclusivity agreement through the INTOG leasing round which, if signed, will allow the project to progress through planning once the INTOG Sectoral Marine Plan process has been completed. While there is the potential for cumulative effects between exploration activity and the INTOG project, given the duration of seaward licence Initial Terms and the likely leasing (2024) and construction timescales for INTOG, it is considered that there is unlikely to be temporal overlap between activities related to leasing/licensing. The North Sea Link interconnector crosses the southern part of the site along a 15km distance, and was installed in 2021. The Environmental Statement[41] for the project noted that the cable installation footprint in the site would be 0.3km^2, or 0.016% of the total site area, and not interact with the area of the site within which ocean quahog aggregations occur[42].

The main sources of pressure affecting the East of Gannet and Montrose Fields MPA are from demersal fisheries and, oil and gas activity. The SACO for the site only refers to four previous exploration wells within the site, however, a number of oil and gas fields are located within the site, including Gannet, Montrose, Arbroath, Godwin, Shaw, Cayley, Arkwright and Madoes, for which there are associated wells, pipelines, fixed surface installations, and subsea infrastructure. These fields have been in production for some time, for example Arbroath and Montrose commenced production in 1990 and 1976 respectively, though production is now much reduced, and were present well in advance of the East of Gannet and Montrose Fields MPA being designated. While there will have been some historical discharges of cuttings contaminated with oil based muds within the site (e.g. see ERT 2005), discharges associated

[39] https://www.gov.uk/government/publications/rosebank-field-development
[40] Based on: https://hub.jncc.gov.uk/assets/411ea794-b135-4877-9fc8-e3e6c054eef9#FSSB-2-DataConfidenceAssessment-v5.0.pdf
[41] https://northsealink.com/media/1196/p1568_rn3057-norway-uk-environmental-statement.pdf
[42] https://hub.jncc.gov.uk/assets/18a1c6a2-7dc3-4ee5-b6fd-09f756d2d30c#EGM-2-DataConfidenceAssessment-v5.0.pdf

with any of the wells that could be drilled as part of the 33rd Round would be subject to mandatory controls (Section 3.4), including chemical risk assessment, and evidence suggests that well-related discharges will not lead to significant effects (see Section 4.4 of BEIS 2022b). The pipelines located within the site, both associated with the above fields and those which traverse the site including the CATS and Langeled gas pipelines, were almost exclusively (exceptions being the Cayley and Shaw fields) installed in advance of the site designation, though are noted in the SACO to have potentially impacted the extent and distribution of features, including ocean quahog. While several Blocks are located within the part of the site within which ocean quahog has been found (21/25c, 22/21d), site surveys are required to be undertaken before drilling rig placement (for safety and environmental reasons) and the results of such surveys allow for the identification of further mitigation including the re-siting of activities (e.g. wellhead or rig anchor positions) to ensure sensitive seabed surface features are avoided. While there is the potential for cumulative effects from rig siting and related discharges from the drilling of wells within those Blocks applied for within the East of Gannet and Montrose Fields MPA, the small scale of impact and temporary nature of any effect are such that the licensing of those Blocks will not significantly hinder the achievement of the site's conservation objectives.

Fisheries management options are being developed for the site, but the nature and timing of any potential restrictions on these activities are uncertain. Demersal fisheries, including for *Nephrops*, are known to take place in the south of the site, corresponding with the offshore deep-sea muds habitat. While the siting of a rig has the potential to act cumulatively with such activity, as noted above, rig site survey would allow for the identification of sensitive habitats in order to try and avoid these, or minimise impacts. Additionally, when any surface structure (fixed and floating installations) used for drilling becomes operational, a statutory safety zone with a radius of 500m is created, other activities are excluded from taking place within the zone, including fisheries. In view of the differences in relative scale of physical impacts resulting from trawling and from oil and gas exploration (both spatially and temporally), and the exclusion of fisheries during drilling-related activities, cumulative effects are not expected to significantly hinder the conservation objectives of the site being achieved.

With the exception of fishing activity, the intensity of which is relatively low across both sites (see Appendix 1h, BEIS 2022a), there is relatively little activity that takes place in Fulmar MCZ or Swallow Sand MCZ that could act cumulatively with the licensing of the Blocks relevant to these sites. Some oil and gas infrastructure is located in the north of Fulmar MCZ, but most are subject to decommissioning. The SACO for Fulmar indicates the potential for past oil and gas activity, and decommissioning, to result in the introduction of hard substrates and cuttings piles, which could alter the natural extent of the protected features, including the supporting habitat of the ocean quahog. The objective for the site attributes including feature extent and distribution and supporting processes, are set to maintain, and the SACO notes that activities should look to minimise, as far as practicable, a change in substrata. The potential area of rig stabilisation material that could be required, if used for the three Blocks applied for, is small relative to the site area (0.0002%); note that all three of these Blocks are part of a single licence application area, and it is assumed that only one well will be drilled across these three Blocks. Data is not available to put this in the context of any existing hard substrate deposition, however, as noted in the SACO, any use of stabilisation material within the site, if required, should be minimised.

5.2 Southern North Sea

As noted in Section 4, the source of effect relevant to the southern North Sea sites screened in is for physical disturbance and marine discharges related to exploration/appraisal well drilling. The following sections provide a description of the relevant sites following by an assessment of the potential for the pressures associated with drilling and discharges to hinder the achievement of site conservation objectives.

5.2.1 Relevant sites

Holderness Inshore MCZ[43]

The site is located between Skipsea in the north and Spurn Head in the south, extending 6km offshore and covering an area of 309km^2. The site is designated for intertidal sand and muddy sand, moderate and high energy circalittoral rock, a range of other subtidal sediments from mud to coarse sediment, and the Spurn Head geological feature.

The intertidal area is made up of an open beach of relatively mobile sediments, backed by soft, readily eroding cliff comprising glacial tills overlain with sands (see Balson *et al.* 1998, Blewett & Huntley 1998). The subtidal area of the site is composed of high and moderate energy circalittoral rock, subtidal coarse and mixed sediment, subtidal mud and subtidal sand with subtidal water depths reaching approximately 15m. The rocky interest features of the site are made up of cobble boulder and post-glacial deposits.

The site is also designated for a subtidal elements of the Spurn Head geological feature[44] which includes a ridge of clay banks at the entrance to the Humber Estuary known locally as "The Binks". This is a harder geological area than that which surrounds it, thought to be Quaternary boulder clay, and traps sediment reducing erosion to the Spurn Head feature. HR Wallingford (2002) indicated that the tidal current of the Humber Estuary acts as a hydraulic groyne and partly blocks the passage of gravels and some sands, which are deposited north of the Binks, and also into New Sand Hole which acts as a sediment sink (Scott Wilson 2009).

The diverse substrates across the site support hydroid/bryozoan turf, sponges and other encrusting fauna, benthic, demersal and juvenile fish species, a small number of elasmobranch species as well as commercially significant crustaceans.

Holderness Offshore MCZ[45]

The Holderness Offshore MCZ with an area of 1,176km^2 is partly inshore and partly offshore, in depths ranging from just over 5m to 50m. The majority of the site experiences moderate wave and current energy at the seabed with lower wave energy towards the east of the site, and tidal currents near the site primarily occur in a southwest and northeast direction.

The site contains good examples of the broad-scale habitats Subtidal mixed sediment, Subtidal sand and Subtidal coarse sediment. The southeast of the site also contains an area of

[43] Site description in part based on: https://designatedsites.naturalengland.org.uk/Marine/MarineSiteDetail.aspx?SiteCode=UKMCZ0035#backgroundinfo, Net Gain (2011): http://publications.naturalengland.org.uk/publication/1466980

[44] See the Geological Conservation Review site report: https://webarchive.nationalarchives.gov.uk/ukgwa/20190301161541mp_/http://jncc.defra.gov.uk/pdf/gcrdb/GCRsiteaccount2111.pdf

[45] Site description based on: https://jncc.gov.uk/our-work/holderness-offshore-mpa/, Net Gain (2011): http://publications.naturalengland.org.uk/publication/1466980

geological interest (the northern point of the Inner Silver Pit glacial tunnel). This area has a high species biodiversity and is an ecologically important area providing habitats for many species; the brittle star, *Ophiothrix fragilis* has been identified in high abundances (Tappin *et al.* 2011), and commercially significant European lobster (*Homarus gammarus*), edible or brown crab (*Cancer pagurus*) and scallops (e.g. *Aequipecten opercularis*) are abundant over much of the area. Additionally, the threatened and/or declining ocean quahog (*Arctica islandica*) is also found within this MCZ (García *et al.* 2019) and is a protected feature of the site.

Cromer Shoal Chalk Beds MCZ[46]

The Cromer Shoal Chalk Beds MCZ is located on the North Norfolk Coast and extends from Weybourne to Happisburgh, from 200m off the coast to a distance of between 5 and 10km offshore, has an area of 315.64km^2 (Net Gain 2011), and slopes to a depth of 27m LAT (Green 2015). This site includes important geological features, including the best examples of subtidal chalk beds in the North Sea as well as subtidal exposures of clay and peat in the northwest of the site. Topographically, the site is broadly flat, but contains ridges, gullies, and undulations.

A large area of infralittoral rock extends for almost the entire length of the site from east to west, but is generally restricted to shallow inshore waters (up to 10m depth). This wide area of hard, stable substrate provides a suitable habitat for attached and mobile epifauna, with the site mostly dominated by gravel interspersed with fine sediments. Crustaceans settle in the crevices formed by the erosion of the chalk, including lobsters (*Hommarus* sp.), langoustines (Nephropidae sp.) and brown crab (*Cancer pagurus*). Grazing animals including the common limpet (*Patella vulgata*), chitons (*Leptochiton* sp.) and gastropods such as the topshell (*Calliostoma zizyphinum*) are supported by the growth of algae on the shallow chalk beds. The nearshore is often dominated by foliose red and brown algae. Extending beyond this infralittoral rock into deeper water is a band of circalittoral rock with more epifauna and, as a result of less light penetration, a marked decrease in macroalgae (Green & Dove 2015). Many mobile crustaceans settle in the crevices formed by the erosion of the chalk, including lobsters and brown crab. Both the areas of infralittoral and circalittoral rock are comprised of subtidal chalk, as well as other rock types.

Blue mussel beds (*Mytilus edulis*) have historically been reported in the east of the site, but recent surveys have only found aggregations of dead mussel shells. Large populations of the Ross worm (*Sabellaria spinulosa*) have been confirmed at numerous locations in the east (Green & Dove 2015).

Following a curve directly offshore from Sheringham, East and West Runton, to Cromer, subtidal chalk occurs quite close to the intertidal zone, but extends further offshore in the southeast portion of the site. In this area, towards Sea Palling, the inshore chalk is replaced by subtidal sand and mixed sediments. Further offshore, beyond the chalk beds, the site is dominated by subtidal coarse sediments, with a thin band of mixed sediments running from east to west. To the northwest, the coarse sediments transition to finer material, with a mixture of subtidal mud and sand. This area of the southern North Sea is a dynamic environment with vast quantities of sediment constantly moved around the site by tides and currents (HR Wallingford 2002), so the sediment distributions and rock exposures are subject to change; new areas of chalk may become exposed and others become covered by sediment when there are tidal surges or storms (JNCC 2004).

[46] Site description based on: https://designatedsites.naturalengland.org.uk/Marine/MarineSiteDetail.aspx?SiteCode=UKMCZ0031 and Net Gain (2011): http://publications.naturalengland.org.uk/publication/1466980

Markham's Triangle MCZ[47]

The site is located approximately 137km from Humberside in the shallow southern North Sea, with depths across the site varying between 25-50m. The site's protected features are four broadscale habitats, Subtidal coarse sediment, Subtidal sand, Subtidal mud, and Subtidal mixed sediments, which accommodate a variety of species, including, starfish, bristleworms, burrowing molluscs such as razor and venus clams, sea urchins, crabs, and a range of fish species including sole, plaice (*Pleuronectes platessa*) and European smelt (*Osmerus eperlanus*). An updated habitat map was produced from data collected as part of the 2012 MCZ survey campaign and the data and related habitat map provides a high level of confidence the extent and distribution of the protected features of the site.

5.2.2 Assessment

The conservation objectives of relevant sites and information relating to site selection and advice on operations have been considered against the work programme for the areas applied for to determine whether site conservation objectives could be hindered. The results are given in Table 5.4 below. All mandatory control requirements (Section 3.4), are assumed to be in place as a standard for all activities assessed.

Table 5.4: Consideration of potential physical disturbance and drilling effects and relevant site conservation objectives

Holderness Inshore MCZ[48]
Site Information
Area (ha/km²): 30,887/308.9 **Designated features**: High energy circalittoral rock, Intertidal sand and muddy sand, Moderate energy circalittoral rock, Subtidal coarse sediment, Subtidal mixed sediments, Subtidal mud, Subtidal sand, Spurn Head (Subtidal; geomorphological interest feature). **Conservation objectives**: The conservation objective is that the protected habitats: • Are maintained in favourable condition if they are already in favourable condition • Be brought into favourable condition if they are not already in favourable condition For each protected feature, favourable condition means that, within the MCZ: • Its extent is stable or increasing • Its structure and functions, its quality, and the composition of its characteristic biological communities (including diversity and abundance of species forming part or inhabiting the habitat) are sufficient to ensure that its condition remains healthy and does not deteriorate. Any temporary deterioration in condition is to be disregarded if the habitat is sufficiently healthy and resilient to enable its recovery. For the geological feature within the MCZ (Spurn, subtidal) favourable condition means: • Its extent, component element and overall integrity are maintained • Its structure and functioning are unimpaired. • The feature remains unobscured so its condition may be determined. Any alteration to a feature brought about entirely by natural processes is to be disregarded when determining whether a protected feature is in favourable condition.
Relevant Blocks with potential for physical disturbance and drilling effects
47/7b

[47] Site description based on: https://jncc.gov.uk/our-work/markhams-triangle-mpa/
[48] https://designatedsites.naturalengland.org.uk/Marine/MarineSiteDetail.aspx?SiteCode=UKMCZ0035

Activities associated with the proposed work programmes within the relevant licence areas
Drilling of one well involving - siting of rig, drilling discharges
Assessment of effects on site integrity

Rig siting

(**Relevant pressures:** *penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion; physical change (to another sediment/seabed type), introduction or spread of non-indigenous species*)

There is a very small overlap with Block 47/7b and the Holderness Inshore MCZ and so there is considerable scope to locate the rig outside of the site and avoid any direct physical impacts from rig siting. While a larger part of the Block is within the assumed distance from a jack-up rig within which effects may occur (500m, see Table 2.1), this is very still small relative to the wider area of the Block outside of the site. Should a rig be sited within the site boundaries, the maximum spatial footprint of the penetration and/or disturbance pressure associated with jack-up rig siting is small (approximately 0.8km^2) compared to the site area (covering 0.26%).

There may be a requirement for rig stabilisation depending on local seabed conditions. In soft sediments, deposited rock may cover existing sediments resulting in a physical change (to another seabed type), and the protected features which have the potential to be impacted by rig siting are considered to be sensitive to this pressure, which assumes a permanent change of habitat. The potential area of change in sediment/seabed type from rig stabilisation is small (estimated at 0.001-0.004km^2 per rig siting, see Table 2.1). The SACO notes that previous physical impacts on the site, including pipeline trenches, do not show signs of infilling such that they are considered to represent permanent or long-term changes. Any change to the site from the placement of a rig could, therefore, represent a long-term change, albeit over a very limited area of the sites. It is considered that there is sufficient mitigation available, in the form of micro-siting of any rig, to avoid direct impacts on the site, such that, within the MCZ, effects on the extent, structure, and function of the protected features will not occur, and the achievement of the conservation objectives for these features will not be hindered.

The risks to the Spurn Head geological feature from pressures related to exploration and appraisal drilling has not been assessed for Holderness Inshore MCZ[49], however, as any rig would be located outside of the Holderness Inshore MCZ and have no direct impacts on the feature, and be on location for only a short period of time (up to 10 weeks), it is considered unlikely that its presence could affect coastal and offshore sediment transport in a way that would affect the extent of the feature, or impair its structure or function.

Management of the spread of non-native species from vessels and rigs is being progressed through international measures, and the risk is limited by the operational range of rigs on the UKCS.

Drilling discharges

(**Relevant pressures:** *abrasion/disturbance of the substrate on the surface of the seabed; habitat structure changes - removal of substratum (extraction*), *contaminants, smothering and siltation rate changes)*

Any discharge from exploration well drilling would be subject to risk assessment as part of existing regulatory controls (see Section 3.4.1). The advice on operations indicates that the protected features are sensitive to the above pressures, most of which relate to seabed disturbance and habitat changes associated with smothering by drill cuttings near the well location, and that these cuttings can accumulate in piles where currents are generally weak. It is assumed that effects relating to drilling discharges occur within 500m of the well location (Table 2.1). For the areas of Block 47/7b which are located entirely outside of the site, drilling discharges will not significantly impact the extent, structure, or function of the protected features. For the areas of the Block within the site, the maximum spatial footprint within which smothering by drilling discharges and associated habitat structure changes may occur (0.8km^2) is small (representing 0.26% of the total site area) and given the site's exposure to wave energy and high suspended sediment loads related to erosion of the Holderness coast (e.g. Cefas 2016, Blewett & Huntley 1998), redistribution of drilling discharges and recovery from smothering would be rapid, and any change can be considered to be temporary and not significant. Therefore, drilling discharges will not hinder the achievement of the site's conservation objectives.

Cumulative effects

Intra-plan cumulative effects are considered to be unlikely as only Block 47/7b was identified as relevant to the assessment. Section 5.2.3 provides a consideration of potential activities cumulatively with other relevant plans and projects.

[49] https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UKMCZ0035

Conclusion
The siting of a rig and related discharges in 47/7b will not significantly hinder the achievement of the Holderness Inshore MCZ site conservation objectives.

Holderness Offshore MCZ[50]

Site Information

Area (ha/km²): 117,600/1,176
Designated features: Subtidal coarse sediment, Subtidal sand, Subtidal mixed sediments, Ocean quahog (*Arctica islandica*); North Sea glacial tunnel valleys (geological interest feature)

Conservation objectives:
The conservation objective is that the protected features:

- so far as already in favourable condition, remain in such condition
- so far as not already in favourable condition, be brought into such condition, and remain in such condition

With respect to Subtidal coarse sediment, Subtidal sand and Subtidal mixed sediments within the MCZ, this means that:

- its extent is stable or increasing, and
- its structures and functions, its quality, and the composition of its characteristic biological communities (which includes a reference to the diversity and abundance of species forming part of or inhabiting that habitat) are such as to ensure that it remains in a condition which is healthy and not deteriorating.

Any temporary deterioration in condition of the Subtidal coarse sediment, Subtidal sand and Subtidal mixed sediments features is to be disregarded if the habitat is sufficiently healthy and resilient to enable its recovery. Any alteration to that feature brought about entirely by natural processes is to be disregarded.

With respect to the Ocean quahog (*Arctica islandica*) within the MCZ, this means that the quality and quantity of its habitat and the composition of its population in terms of number, age and sex ratio are such as to ensure that the population is maintained in numbers which enable it to thrive. Any temporary reduction of numbers is to be disregarded if the population is sufficiently thriving and resilient to enable its recovery. Any alteration to that feature brought about entirely by natural processes is to be disregarded.

With respect to the North Sea glacial tunnel valleys within the Zone, this means that:

i. its extent, component elements and integrity are maintained;
ii. its structure and functioning are unimpaired; and
iii. its surface remains sufficiently unobscured for the purposes of determining whether the conditions in paragraphs (i) and (ii) are satisfied.

Any obscurement of that feature brought about entirely by natural processes is to be disregarded. Any alteration to that feature brought about entirely by natural processes is to be disregarded.

Relevant Blocks with potential for physical disturbance and drilling effects

47/10c, 47/13, 47/14, 47/15, 47/3j, 47/3k, 47/4d, 47/5b, 47/7b, 47/8a, 47/9a, 48/1, 48/11b, 48/6c

Activities associated with the proposed work programmes within the relevant licence areas

Drilling of up to 7 wells involving - siting of rig, drilling discharges

Assessment of effects on site integrity

Rig siting
(**Relevant pressures:** *penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion; physical change (to another sediment/seabed type), introduction or spread of non-indigenous species*)

All or substantial parts of Blocks 47/7b, 47/8a, 47/9a and 47/10c overlap the Holderness Offshore MCZ, with the remaining Blocks screened in (47/10c, 47/13, 47/14, 47/15, 47/3j, 47/3k, 47/4d, 47/5b, 48/1, 48/11b, 48/6c), largely or entirely outside of the site boundaries. The advice on operations indicates that all of the site's features are sensitive to the above pressures, which are relevant to the siting of drilling rigs and related exploration drilling. For those Blocks with little spatial overlap with the site (47/3k, 47/4d, 47/5b, 47/14, 47/15), there is considerable potential that physical disturbance effects may be avoided, or for those Blocks with no overlap (47/13, 48/1, 48/11b, 48/6c), completely avoided. Should a rig be located within the site, the maximum spatial footprint of the

[50] https://jncc.gov.uk/our-work/holderness-offshore-mpa/

penetration and/or disturbance pressure associated with jack-up rig siting is small (0.8km^2, see Table 2.1) compared to the site (covering 0.07%). It is noted that, with the exception of the North Sea glacial tunnel valley, that the site's features are judged to be in unfavourable condition[51], the reasons for which are set out in the site's SACO, which relate to the sensitivities of the site's features to ongoing pressures, which are identified as oil and gas related activities, including the nature and extent of pipeline and other protection materials, and also demersal fishing activity; these activities were present over the site in advance of its designation. The placement of a rig within the site, should this occur, would result in temporary effects, with the depressions arising from spud can placement likely to infill and be reworked relatively rapidly (for example see Section 4.4.1 of BEIS 2022b), noting the relatively dynamic nature of much of the site. It is not considered likely that the temporary placement of a rig within the site will affect the extent, structure, or function of any of the features of the Holderness Offshore MCZ in a way in which the achievement of the conservation objectives of the site will be significantly hindered.

There may be a requirement for rig stabilisation depending on local seabed conditions. In soft sediments, deposited rock may cover existing sediments resulting in a physical change (to another seabed type), and the protected features which have the potential to be impacted by rig siting are considered to be sensitive to this pressure, which assumes a permanent change of habitat. The SACO for the MCZ notes that the confidence in the "recover" objective for the site, e.g. in relation to the extent and distribution attribute, would be improved with better information on the total volumes of protection materials which have been placed within the site. The advice within the SACO is that activities should look to minimise, as far as is practicable, changes in substrata within the site, which may also affect the extent and distribution of the supporting habitat of other features such as the ocean quahog. Should a rig be sited within the Holderness Offshore MCZ and stabilisation material be required, the potential change of sediment/seabed type is small (estimated area of 0.001-0.004km^2 per rig siting, see Table 2.1), at up to 0.0003% of the site area. The use of rock placement for rig stabilisation, which is not easily removed, would likely result in a localised but permanent change in habitat. Where possible, and subject to meeting the technical and safety requirements of rig placement at a particular location, removable mud mats or anti-scour mats should be used if drilling takes place within the site. Where this is not possible, the extent of rock placement should be minimised. In view of the very small scale of potential impact on the site, and the potential for mitigation both through avoiding drilling within the site, or the use of methods to avoid a permanent change in habitat type, it is concluded that the licensing of Blocks listed above will not significantly hinder the achievement of the site's conservation objectives.

Management of the spread of non-native species from vessels and rigs is being progressed through international measures, and the risk is limited by the operational range of rigs on the UKCS.

Drilling discharges
(**Relevant pressures:** *abrasion/disturbance of the substrate on the surface of the seabed; habitat structure changes - removal of substratum (extraction*), *contaminants, smothering and siltation rate changes)*

The protected habitats and species of the site are sensitive to abrasion/disturbance of the seabed surface, siltation rate changes including smothering, contaminants (e.g. hydrocarbons) and habitat structure changes, removal of substratum (extraction) pressures associated with drilling discharges. Any discharge from exploration well drilling would be subject to risk assessment as part of existing regulatory controls (see Section 3.4.1). It is assumed that effects relating to drilling discharges occur within 500m of the well location (Table 2.1). Some of the Blocks applied for are entirely outside of the site (47/13, 48/1, 48/11b, 48/6c), such that discharges associated with any well are unlikely to impact the protected features. For those Blocks that substantially overlap the site or are entirely within its boundaries, the maximum spatial footprint within which smothering by drilling discharges may occur (0.8km^2) is small (representing 0.03% of the total site area). As the feature lies in a relatively low energy environment, drill cuttings may not be removed by currents, and result in localised smothering, with a likely temporary effects. The small scale and temporary nature of potential smothering, as well as mandatory control requirements with respect to drilling chemical use and discharge (Section 3.4.1), are such that the achievement of the site conservation objectives will not be significantly hindered.

Cumulative effects
Intra-plan cumulative effects are possible although spatial footprints associated with rig installation and drilling discharges in the Blocks screened in are localised and temporary (other than any rig stabilisation using rock), and unlikely to overlap either spatially or temporally. Given the indicative work programmes, the combined spatial footprint within which physical disturbance and drilling effects could occur (within 500m of the rig/well location) across the Blocks (a high case scenario of seven wells) is estimated at 5.6km^2 (0.5% of the site). With regards to rig stabilisation, should all seven wells be drilled within the site, this could cover an area of 0.03km^2 or 0.002%

[51] https://hub.jncc.gov.uk/assets/d439f5d1-5440-4547-84fb-8bd6ec970e44#HoldernessOffshore-ConservationStatements-V1.0.pdf

of the site area. The localised and temporary nature of the disturbance and available mitigation to avoid permanent change to the extent and distribution of the site's features, are such that it is concluded that combined effects of Blocks licensing will not significantly hinder the site's conservation objectives. Section 5.2.3 provides a consideration of potential cumulative effects with other projects.

Conclusion
The siting of a rig and related discharges in 47/10c, 47/13, 47/14, 47/15, 47/3j, 47/3k, 47/4d, 47/5b, 47/7b, 47/8a, 47/9a, 48/1, 48/11b and 48/6c will not significantly hinder the achievement of the Holderness Offshore MCZ site conservation objectives.

Cromer Shoal Chalk Beds MCZ[52]

Site Information

Area (ha/km²): 32,048/320.5
Designated features: High energy circalittoral rock, High energy infralittoral rock, Moderate energy circalittoral rock, Moderate energy infralittoral rock, North Norfolk coast (Subtidal), Peat and clay exposures, Subtidal chalk, Subtidal coarse sediment, Subtidal mixed sediments, Subtidal sand.

Conservation objectives:
The conservation objective is that the protected habitats:

- Are maintained in favourable condition if they are already in favourable condition
- Be brought into favourable condition if they are not already in favourable condition

For each protected feature, favourable condition means that, within the MCZ:

- Its extent is stable or increasing
- Its structure and functions, its quality, and the composition of its characteristic biological communities (including diversity and abundance of species forming part or inhabiting the habitat) are sufficient to ensure that its condition remains healthy and does not deteriorate.

For the feature of geological interest, favourable condition means, within the MCZ:

1. Its extent, component element and overall integrity are maintained
2. Its structure and functioning are unimpaired.
3. Its surface remains sufficiently unobscured for the purposes of determining whether the conditions in paragraphs (1) and (2) are satisfied.

Any temporary deterioration in condition is to be disregarded if the habitat is sufficiently healthy and resilient to enable its recovery.

Any alteration to a feature brought about entirely by natural processes is to be disregarded when determining whether a protected feature is in favourable condition.

Relevant Blocks with potential for physical disturbance and drilling effects

48/28b

Activities associated with the proposed work programmes within the relevant licence areas

Drilling of one well involving - siting of rig, drilling discharges

Assessment of effects on site integrity

Rig siting
(**Relevant pressures:** *penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion; physical change (to another sediment/seabed type), introduction or spread of non-indigenous species*)

There is a very small overlap with Block 48/28b and the Cromer Shoal Chalk Beds MCZ (0.2km²) and so there is considerable scope to locate the rig outside of the site and avoid any direct physical impacts from rig siting. While a larger part of the Block is within the assumed distance from a jack-up rig within which effects may occur (500m, see Table 2.1), this is still very still small relative to the wider area of the Block outside of the site. Should a rig be sited within the site boundaries, the maximum spatial footprint of the penetration and/or disturbance pressure associated with jack-up rig siting is small (approximately 0.8km²) compared to the site area (covering 0.25%), however, due to the considerable scope available to site the rig away from the site, any effect can be avoided,

[52] https://designatedsites.naturalengland.org.uk/Marine/MarineSiteDetail.aspx?SiteCode=UKMCZ0031 – the conservation advice package for this site is under review.

and it would be expected that this would form the basis of any mitigation required as part of assessment at the project level (see Section 6).

There may be a requirement for rig stabilisation depending on local seabed conditions. In soft sediments, deposited rock may cover existing sediments resulting in a physical change (to another seabed type), and the protected features which have the potential to be impacted by rig siting are considered to be sensitive to this pressure, which assumes a permanent change of habitat. The potential change of sediment/seabed type from rig stabilisation is small (estimated area of 0.001-0.004km^2 per rig siting, see Table 2.1). The SACO notes that a number of attributes relevant to the protected features (e.g. Distribution: presence and spatial distribution of biological communities, Structure: species composition of component communities, Structure: sediment composition and distribution) may be vulnerable to the installation of infrastructure that is likely to result in a change to the nature or extent of the feature, which includes, for example, rock armouring of cables and pipelines. While the scale of any rig stabilisation materials would be small relative to the site area, the SACO noted that activities causing such permanent change would likely significantly impact related attributes and trigger a "recover" target (note these are presently set to "maintain"). It is considered that there is sufficient mitigation available, in the form of micro-siting such that direct impacts on the site will not occur, related effects on the extent, structure, and function of the protected features will not occur; and the achievement of the conservation objectives for these features will not be hindered.

Management of the spread of non-native species from vessels and rigs is being progressed through international measures, and the risk is limited by the operational range of rigs on the UKCS.

Drilling discharges
(**Relevant pressures:** *abrasion/disturbance of the substrate on the surface of the seabed; habitat structure changes - removal of substratum (extraction*), *contaminants, smothering and siltation rate changes)*

The advice on operations indicates that the relevant qualifying features are sensitive to the above pressures, most of which relate to seabed disturbance and habitat changes associated with smothering by drill cuttings near the well location, and that these cuttings can accumulate in piles where currents are generally weak. It is assumed that effects relating to drilling discharges occur within 500m of the well location (Table 2.1), therefore, drilling discharges have a limited ability impact the site due to the small overlap between Block 47/28b and the considerable scope to avoid site interaction through rig siting. Additionally, the site is subject to relatively high levels of tidal energy, and drill cuttings would not be expected to accumulate in this area such that smothering and siltation rate changes could result in significant effects. Discharges associated with drilling in Block 47/28b will not impact the extent, structure, and function of the protected habitats, and will not hinder the conservation objectives of the site.

Cumulative effects
Intra-plan cumulative effects are considered to be unlikely as only Block 48/28b was identified as relevant to the assessment. Section 5.2.3 provides a consideration of potential activities cumulatively with other relevant plans and projects.

Conclusion
The siting of a rig and related discharges in Block 48/28b will not hinder the achievement of the Cromer Shoal Chalk Beds MCZ site conservation objectives.

Markham's Triangle MCZ[53]

Site Information

Area (ha/km^2): 20,000/200
Designated features: Subtidal coarse sediment, Subtidal sand, Subtidal mud, Subtidal mixed sediments

Conservation objectives:
The Conservation Objective for the Markham's Triangle Marine Conservation Zone is that the protected features:

- so far as already in favourable condition, remain in such condition; and
- so far as not already in favourable condition, be brought into such condition, and remain in such condition.

With respect to Subtidal coarse sediment, Subtidal sand, Subtidal mud and Subtidal mixed sediments within the Zone, means that:

- Its extent is stable or increasing; and

[53] https://jncc.gov.uk/our-work/markhams-triangle-mpa/

- Its structures and functions, its quality, and the composition of its characteristic biological communities (which includes a reference to the diversity and abundance of species forming part of or inhabiting that habitat) are such as to ensure that it remains in a condition which is healthy and not deteriorating.

Any temporary deterioration in condition is to be disregarded if the habitat is sufficiently healthy and resilient to enable its recovery. Any alteration to that feature brought about entirely by natural processes is to be disregarded.

Relevant Blocks with potential for physical disturbance and drilling effects

44/27

Activities associated with the proposed work programmes within the relevant licence areas

Drilling of one well involving - siting of rig, drilling discharges

Assessment of effects on site integrity

Rig siting
(**Relevant pressures:** *penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion; physical change (to another sediment/seabed type), introduction or spread of non-indigenous species*)

Block 44/27 is located 5.7km to the northwest of Markham's Triangle MCZ, and direct physical impacts on any of the site's protected features are not considered to be possible noting the assumed distance from a jack-up rig within which effects may occur (500m, see Table 2.1).

Management of the spread of non-native species from vessels and rigs is being progressed through international measures, and the risk is limited by the operational range of rigs on the UKCS.

Drilling discharges
(**Relevant pressures:** *abrasion/disturbance of the substrate on the surface of the seabed; habitat structure changes - removal of substratum (extraction*), *contaminants, smothering and siltation rate changes)*

The advice on operations indicates that the relevant qualifying features are sensitive to the above pressures, though the SACO for the site makes no specific mention of oil and gas activities, including exploration wells. It is assumed that effects relating to drilling discharges occur within 500m of the well location (Table 2.1), therefore, drilling discharges will not impact the extent, structure, and function of the protected habitats, as the only Block screened in for this site (44/27) is significantly further away than this distance (5.7km).

Cumulative effects
Intra-plan cumulative effects are not considered to be possible as only Block 44/27 was identified as relevant to the assessment and only one related work programme has been proposed. Section 5.2.3 provides a consideration of potential cumulative effects with other projects.

Conclusion
The siting of a rig and related discharges in Block 44/27 will not hinder the achievement of the Markham's Triangle MCZ site conservation objectives.

5.2.3 Cumulative effects

There are a number of potential interactions between activities that may follow licensing and those existing or planned activities, for instance in relation to renewable energy, offshore oil and gas and gas storage (including carbon dioxide storage), fishing, and aggregate extraction. These activities are subject to individual permitting or consenting mechanisms or are otherwise managed at a national level. Interactions have been identified on the basis of the nature and location of existing or proposed activities and spatial datasets in a Geographic Information System (GIS). Projects relevant to this in-combination effects assessment, along with their status and relevant sites are tabulated in Table 5.5.

The Blocks applied for are in the North East, and East Inshore and Offshore Marine Plan areas. The East Marine Plans indicate that (paragraph 295), "*Future oil and gas activity has the potential to require access to the same area of seabed as other activities. In most cases,*

the consequence of this will be insignificant due to the small footprint of oil and gas production infrastructure. In some cases this may not be the case, such as where another user of the sea bed has a lease in place. Where a lease has been agreed for a co-located activity, there may be a requirement for negotiation between parties involved." and is supported in plan policies such as GOV2 and GOV3, which respectively promote the maximisation of activity co-existence, and the demonstration that activity displacement will be avoided, minimised, or mitigated. Policies in the North East Marine Plans are consistent with those of the East Marine Plans, for example, marine plan NE-CO-1 and NE-OG-1/OG-2 indicate a preference for projects that optimise their use of space and consider co-existence opportunities, and safeguard existing seaward oil and gas licences and future discoveries from new proposals respectively.

Table 5.5: Projects relevant to the cumulative effects assessment for the southern North Sea

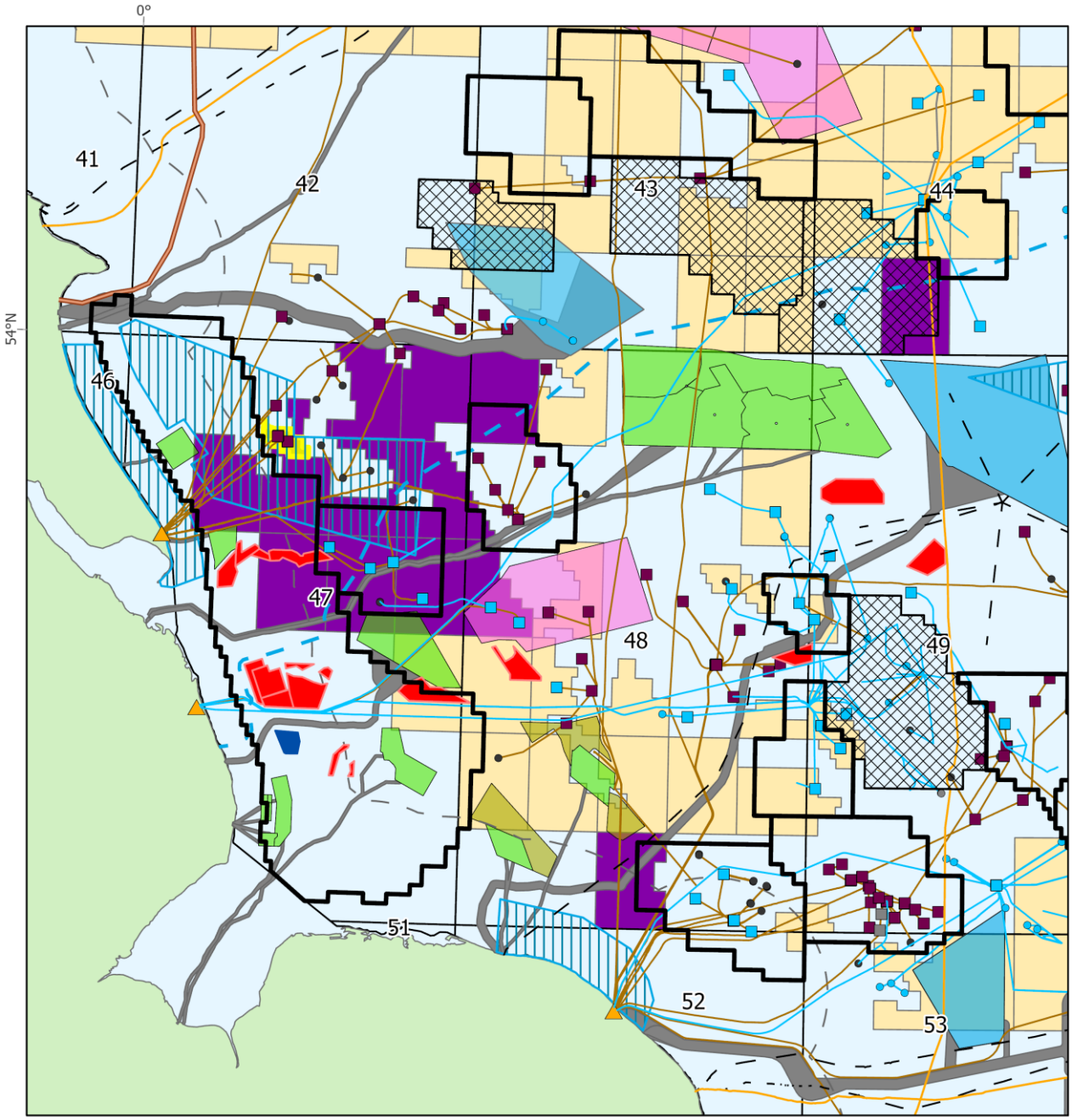
Relevant project	Project summary	Project status	Relevant sites[1]
Humber Gateway offshore wind farm	The project has 73 turbines providing an installed capacity of 219MW, with export cabling having its landfall on the south of the Holderness coast near Easington.	Operational	Holderness Inshore MCZ, Holderness Offshore MCZ
Westermost Rough offshore wind farm	The project includes 35 turbines providing an installed capacity of 210MW, with export cabling having its landfall on the Holderness coast near Withernsea.	Operational	Holderness Inshore MCZ
Hornsea Project Three wind farm	It is expected that up to 6 cables will take power ashore in a corridor extending from the south west corner of the zone to a landfall on the North Norfolk Coast.	Consented. Offshore construction expected from 2024.	Cromer Shoal Chalk Beds MCZ, Markham's Triangle MCZ
Norfolk Vanguard/Boreas wind farms (export cable)	The landfall for these projects is proposed to be at Happisburgh South.	Consented	Cromer Shoal Chalk Beds MCZ
Sheringham Shoal and Dudgeon offshore wind farm (export cable)	The export cables have their landfall near Weybourne Hope.	In operation	Cromer Shoal Chalk Beds MCZ
Sheringham and Dudgeon extension projections (export cable)	It is proposed that the export cables for the two projects are at Weybourne beach.	In planning	Cromer Shoal Chalk Beds MCZ
Tolmount gas field (export pipeline)	Located in Block 42/28d, the Tolmount gas field development includes a minimal facilities platform and a new gas export pipeline to shore.	In operation	Holderness Inshore MCZ, Holderness Offshore MCZ
Easington Gas terminal related pipelines	Pipelines include those for the York, Cleeton, Amethyst and West Sole fields, as well the Langeled pipeline and that for Rough gas storage.	In operation	Holderness Inshore MCZ, Holderness Offshore MCZ
Bacton Gas terminal related pipelines	Pipelines include those for the Shearwater, Esmond, Clipper, Leman and Hewett fields, with some subject to decommissioning planning.	In operation	Cromer Shoal Chalk Beds MCZ

Relevant project	Project summary	Project status	Relevant sites[1]
Rough Gas storage	A gas storage licence was issued in July 2022 covering the Rough field. The field was previously used for gas storage, and its present phase does not include any new offshore work, i.e. existing wells, pipelines and platforms are to be used to storge gas at Rough.	In operation	Holderness Offshore MCZ
Viking Link interconnector	1,400MW interconnector between Bicker Fen in Lincolnshire and Revsing in South Jutland, Denmark. The cable will be trenched and buried in the North Sea, with the landfall completed using trenchless methods.	Under construction	Holderness Offshore MCZ
Gas field infrastructure	Includes producing gas fields (Ceres, Mercury, York, Apollo, Chiswick) or those which have ceased production. These primarily include subsea templates, wellheads, and pipelines, with relatively few platforms (York, Rough). The Rough gas storage site recommenced operations in 2022.	In operation	Holderness Offshore MCZ, Markham's Triangle MCZ
33rd seaward oil & gas licensing round	Seven Blocks in the southern North Sea (47/3k, 47/7b, 47/8a, 47/9a, 47/10c, 47/14, 47/15) have been applied for and are relevant to the assessment. Activities as part of their work programmes include the drilling of wells.	Areas have been applied for and are not yet licensed.	Holderness Inshore MCZ, Holderness Offshore MCZ
Round 4 wind preferred projects (export cables)	The route of any export cable associated with these projects is uncertain. The assessment is informed by the Round 4 MCZ assessment.	Pre-planning	Holderness Inshore MCZ, Holderness Offshore MCZ, Cromer Shoal Chalk Beds MCZ

Source: relevant Development Consent Orders and related post-consent modifications (https://infrastructure.planninginspectorate.gov.uk/), BEIS: decommissioning of offshore installations and pipelines (https://www.gov.uk/guidance/oil-and-gas-decommissioning-of-offshore-installations-and-pipelines), TCE Open Data Portal (https://thecrownestate.maps.arcgis.com/apps/webappviewer/index.html?id=b7f375021ea845fcabd46f83f1d48f0b) NSTA gas storage and unloading webpage (https://www.nstauthority.co.uk/licensing-consents/gas-storage-and-unloading/

Notes: [1] those sites considered to be relevant to 33rd round exploration activities.

Figure 5.3: Location of blocks applied for in relation to other projects in the southern North Sea



Physical disturbance and drilling effects

The features protected by Holderness Inshore MCZ, Holderness Offshore MCZ, Markham's Triangle MCZ and the Cromer Shoal Chalk Beds MCZ are benthic habitats, and are therefore only considered to be sensitive to those physical effects related to the work programmes for the Blocks identified to be relevant to the assessment of the sites, as listed in Section 4 and assessed in Section 5.2.2. The conclusions of that section are considered here in the context of those relevant projects identified in Table 5.5 above.

The area covered by the Holderness Inshore MCZ has historically been subject to pipeline installation to the gas terminals at Easington and Dimlington; the SACO for the site notes that pipeline trenches which appear to have been excavated through the mixed sediment and the underlying glacial till, do not show signs of having been naturally infilled since construction (Colenutt & Kinnear 2014), such that they represent a long-term/permanent change to the site. More recently, the export pipeline for the Tolmount project was installed through both the Holderness Inshore and Offshore MCZs. Impacts to the sites were considered to be small scale (0.13% of the site area) or temporary, and it was concluded that the installation of the pipeline would not hinder achieving the conservation objectives for either of the sites[54]. Wind farm export cables associated with Westermost Rough and Humber Gateway cross the Holderness Inshore MCZ. Like the majority of the pipelines associated with Easington/Dimlington, these cables were consented and installed in advance of the Holderness Inshore MCZ being designated. While there would have been some change to the extent and distribution, and perhaps function, of a small area of the site, the current SACO does not identify these as site-specific concerns. For most attributes, targets have been set to maintain the feature, or in relation to the presence and abundance of key structural and influential species, to maintain, recover or restore the attribute, suggesting a lack of information on the feature status. A small portion of Block 47/7b is located within Holderness MCZ (~1km^2), and if a rig were to be sited in this area, or within 500m of the site, a small area (maximum 0.8km^2) could be affected by physical disturbance and drilling effects, that would act cumulatively with those other impacts noted above. The small area of overlap reflects the considerable scope to avoid interaction with the site through rig site selection.

Eight gas fields (Ceres, Mercury, York, Apollo, Helvellyn, Eris, Amethyst East and West) and one gas storage site (Rough) are located within the Holderness Offshore MCZ, though in terms of surface infrastructure, only York and Rough have associated platforms; all the other fields are produced via subsea tie-backs to installations outside of the site. A number of pipelines are associated with these fields, or fields located beyond the site boundaries, including those for Cleeton and West Sole, and also the Langeled pipeline. The presence of oil and gas infrastructure is noted in the site SACO[55], with the Subtidal coarse sediment, Subtidal sand, and Subtidal mixed sediments features noted to be exposed to moderate levels of pressure from the activities, for which they are considered to be highly vulnerable. The SACO also notes that the infrastructure includes the placement of protection materials involving either rock placement or concrete mattresses, and regard this to represent some habitat loss and change to sediment type. The SACO also refers to the creation of drill cuttings piles but these do not generally occur in the southern North Sea due to the shallow nature of the area, current strength, and wave action, and so effects from cuttings are highly likely to be only temporary in nature. In addition to oil and gas activity, fisheries (specifically benthic trawling and dredging) are considered to impact the site. The SACO notes that current oil and gas activities do not overlap the known extent of ocean quahog in the site, but that there may have been some effects from pipeline installation, though pressure from demersal trawling and dredging are

[54] https://www.gov.uk/guidance/oil-and-gas-environmental-statements-reviewed
[55] https://hub.jncc.gov.uk/assets/d439f5d1-5440-4547-84fb-8bd6ec970e44#HoldernessOffshore-SACO-V1.0.pdf

considered to be more significant. Export cables for offshore wind farms in the area have, to date, avoided interaction with the Holderness Offshore MCZ, and there are no aggregate extraction areas within the site. While a significant portion of Holderness Offshore MCZ is covered by Blocks 47/7b, 47/8a, 47/9a, there are also significant portions of Blocks 47/3k, 47/4d, 47/5b, 47/7b, 47/10c, 47/14, 47/15 outside of the site within which rig siting could be possible. The physical disturbance caused by rig placement is considered to represent only a temporary effect on the site, and the dispersal of any cuttings (and the reported effects of drilling discharges, see Section 5.9 of BEIS 2022a and Section 4.4 of BEIS 2022b), would similarly be temporary, and would not hinder the ability of the site to meet its conservation objectives. Should stabilisation material be required for rig placement, this would be in the order of 0.001-0.004km^2 per rig siting, and in the unlikely and high case scenario that all eight wells related to the Blocks applied for that overlap the site are drilled, up to 0.03km^2; this would represent 0.003% of the overall site area. As noted in the SACO, there are limited data available to characterise existing levels of hard substrate deposition within Holderness Offshore MCZ to place this level of impact in context. There is the potential for further mitigation through the use of removable stabilisation materials, subject to these meeting the technical and safety requirements of rig placement at a particular location. In view of the temporary nature of the impact of rig placement on the Holderness Offshore MCZ, and the available mitigation which includes rig siting and alternative stabilisation methods, it is not considered that the licensing of Blocks 47/10c, 47/13, 47/14, 47/15, 47/3j, 47/3k, 47/4d, 47/5b, 47/7b, 47/8a, 47/9a, 48/1, 48/11b and 48/6c would result in cumulative effects which could significantly hinder the achievement of the site's conservation objectives. Note that the issue of a licence only provides exclusivity to the applicant for exploration and appraisal activities, it does not provide any form of consent for activities to take place. Consent for drilling activities will be subject to further assessment.

Export cables for the Sheringham Shoal and Dudgeon offshore wind farms cross the western part of the Cromer Shoal Chalk Beds MCZs, and the site's SACO indicates that the extent and distribution of some features (subtidal chalk, high/moderate energy circalittoral/infralittoral chalk) has already been reduced by power cables which have been trenched through the features, though the targets for the attribute are set to maintain the extent and distribution. An assessment undertaken by the applicant concluded that the installation, operation and decommissioning of the project would not hinder the conservation objectives of the site[56], however, following consultation feedback, a Stage 2 assessment was undertaken on a precautionary and without prejudice basis, should it be needed during consenting. Such an assessment involves the identification of measures of equivalent environmental benefit (MEEB) to offset the damage caused by the proposed project; for the Sheringham and Dudgeon project, the MEEB proposed is for the creation and maintenance of an oyster bed of 10,000m^2. As the project is still in examination, it is not clear whether the measures will be required, and if they are, what form they could take.

There are proposals in place for landfalls associated with Hornsea Project Three and export cable agreement areas associated with Norfolk Vanguard/Boreas in the west and east of the site respectively. An assessment under Section 125 of the MCAA was undertaken for the Hornsea Three export cable and landfall[57]. Impacts were identified for the sandwave features of the MCZ related to sandwave clearance and cable protection, however, overall it was

[56] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010109/EN010109-000456-5.6%20Stage%201%20Cromer%20Shoal%20Chalk%20Beds%20Marine%20Conservation%20Zone%20Assessment.pdf

[57] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010080/EN010080-003267-EN010080%20Hornsea%20Three%20-%20Habitats%20Regulations%20Assessment.pdf

concluded that although the duration of effects would be for the lifetime of the project, that they would be reversible as on decommissioning all project-related infrastructure would be removed. It was concluded that the conservation objectives of the site would not be significantly hindered by the installation and operation of the export cable. The landfall for Norfolk Boreas and Norfolk Vanguard was chosen to avoid the Cromer Shoal Chalk Beds MCZ, and so effects on the site from these projects were discounted during consenting[58]. A number of pipelines cross the Cromer Shoal Chalk Beds MCZ on their way to the Bacton gas terminal, including those associated with the Shearwater, Esmond, Clipper, Leman and Hewett fields, some of which are subject to decommissioning planning. These pipelines were present in advance of the MCZ being proposed and designated, and no further pipelines are currently proposed to cross the site. For the majority of attributes listed in the site's SACO, a target has been set to maintain the features, often due to a lack of evidence of impacts from anthropogenic activities. There is a very small overlap between Block 48/28b and the Cromer Shoal Chalk Beds MCZ (0.2km^2), indicating that there is considerable scope to avoid any interaction with the site through rig site selection, and it this would be expected to form the basis of any mitigation required as part of assessment at the project level, such that cumulative effects will not significantly hinder the achievement of the site's conservation objectives.

Two areas applied for in the 1st Carbon Dioxide Storage licensing round (SNS Area 3, SNS Area 6) cover parts of Holderness Offshore MCZ. Activities associated with the work programmes for these areas cover the initial/exploration term of the licences, and is analogous to the activities covered in this assessment which relate to the initial terms of seaward production licences. Like many of the Blocks relevant to Holderness Offshore MCZ, there are considerable areas outside of the site boundaries within which rig siting may be possible, or else, applicants should seek to use removeable rig stabilisation materials where these meet technical and safety requirements, or minimise the use of rock placement, should these be required. The potential cumulative impacts from pressures including penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion, from rig siting would be temporary and spatially limited. Any permanent change in habitat type from the placement of rig stabilisation materials would be minor and subject to assessment at the project level – note that a separate MCZ/MPA assessment has been undertaken for the 1st Carbon Dioxide Storage Licensing Round, which highlights the same mitigation measures referred to in Section 5.2.2 (removable rig stabilisation, where possible).

Markham's triangle SACO contains limited information on the pressures affecting the site, with no objectives set for the feature attributes, however, JNCC (2016) indicates that the site is highly vulnerable to benthic trawling, and Subtidal mud and Subtidal mixed sediments are judged to be in unfavourable condition. While management measures for fisheries within Marham's Triangle MCZ have not been proposed to date, a call for evidence covering the remaining 41 MCZs not already subject to management or consultation on future management, opened in January 2023. In addition to fisheries, the Hornsea Three offshore wind farm is partly located within the site, however, the developer has committed to not place any infrastructure (i.e. foundations, scour protection, cables and associated cable protection) within the boundary of the site, avoiding physical impacts. The Chiswick gas field is located within Markham's Triangle MCZ, which has been in production since 2007. The field includes one fixed surface installation, a subsea tie-back to the Kew field, and an export pipeline to platform J6A in the Dutch waters. In view of the location of Block 44/27 relative to the site (at least 5.7km away), the distance within which effects are predicted to occur from the siting of a rig

[58] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010079/EN010079-004458-NORV-SoS-decision-letter.pdf, https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010087/EN010087-002917-NORB-Boreas-Decision-Letter.pdf

and any related discharges (500m), and their temporary effect, it is not considered that the licensing of the Block would result in cumulative effects which could hinder the achievement of the site's conservation objectives.

It is not considered that any of the Round 4 preferred projects have the potential to act cumulatively with the licensing of the southern North Sea Blocks (Section 4) such that the conservation objectives of the Holderness Inshore and Offshore MCZs or Cromer Shoal Chalk Beds MCZ would be hindered due to the lack of any spatial overlap between the areas and the sites, and also a likely lack of any temporal overlap. An MCZ assessment undertaken as part of the Round 4 process (NIRAS 2022) included a consideration of cable route regions for each of the projects. The assessment noted that a meaningful assessment of export cabling could not be undertaken and that the results of the assessment were therefore indicative, and inferred the potential outcome of project level assessment, should interactions with relevant MCZs occur. It was concluded that, provided a number of interventions could be realised (a set of high level mitigation measures related to risk scores assigned to site features), that there would be no significant risk of Round 4 hindering the achievement of the conservation objectives for the MCZs screened into the assessment, which included Holderness Inshore and Offshore MCZs and Cromer Shoal Chalk Beds MCZ.

Therefore it is concluded that none of the potential cumulative effects identified in relation to the Blocks assessed in relation the MCZs in the southern North Sea (Sections 4 and 5.2.2) would hinder the conservation objectives of Holderness Inshore MCZ, Holderness Offshore MCZ, Cromer Shoal Chalk Beds MCZ, Markham's Triangle MCZ, being achieved.

5.3 Eastern Irish Sea

As noted in Section 4, the source of effect relevant to the eastern Irish Sea sites screened in was for physical disturbance and marine discharges related to exploration/appraisal well drilling. The following sections provide a description of the relevant sites following by an assessment of the potential for the pressures associated with drilling and discharges to hinder the achievement of site conservation objectives.

5.3.1 Relevant sites

West of Walney MCZ[59]

The West of Walney Marine Conservation Zone (MCZ) is located in the Irish Sea, 8 km west of Walney Island off the Cumbrian coast. The site covers an area of 388km^2 in mainly inshore, but also offshore waters, and partly overlaps the Ormonde and Walney offshore windfarms. The site contains two distinct broad-scale habitats; subtidal mud is the most extensive protected feature, and is part of the wider Irish Sea mud belt, and subtidal sand, which occurs over a far smaller area of the site. The subtidal mud is an important habitat for a range of animals including worms, molluscs, sea urchins, crustaceans, including the commercially important Norway lobster and sea-pens.

Sea-pen and burrowing megafauna communities occur on the subtidal mud habitats and are listed as a habitat of conservation importance and are a protected feature. Collectively these

[59] Site description based on: https://designatedsites.naturalengland.org.uk/Marine/MarineSiteDetail.aspx?SiteCode=UKMCZ0045, Irish Sea Conservation Zones Regional Report: http://publications.naturalengland.org.uk/publication/1562384

animals create a network of burrows and tunnels, helping to shelter other small creatures and allow oxygen to penetrate deeper into the sediment. The distribution and extent of sea-pens within the MCZ and the eastern Irish Sea as a whole is not well understood. There are five records of *Virgularia mirabilis* from grab samples across the southern half of the site, but their presence is considered to be rare (Titan environmental surveys 2005, Centre for Marine and Coastal Studies Ltd, 2009).

The subtidal sands within the MCZ support high densities of burrowing brittle stars (*Amphiura filiformis*), horseshoe worms (*Phoronis* spp.) and polychaete worm (*Scalibregma inflatum*), bivalves (*Kurtiella bidentata* and *Chamelea striatula*), and crustaceans (*Corystes cassivelaunus*). Fish typically associated with this sandy sediment within the Irish Sea include solenette (*Buglossidium luteum*), plaice (*Pleuronectes platessa*), dab (*Limanda limanda*), and sole (*Solea solea*).

The *West of Walney Marine Conservation Zone (Specified Area) Bottom Towed Fishing Gear Byelaw 2018* was made by the MMO which prohibits the use of bottom towed fishing gear across most of the site.

Fylde MCZ[60]

Fylde MCZ is in Liverpool Bay between 3 and 20km off the Fylde coast and Ribble Estuary, covering an area of 260km^2 of subtidal mud and sand habitats. These sediment features are considered to be good representatives of the seabed habitats and communities found on the eastern side of Liverpool Bay. The water depths within the site range from almost being exposed on low tide to 22m at its deepest.

The MCZ is adjacent to the Shell Flat sandbank, part of the Shell Flat and Lune Deep Special Area of Conservation (SAC). The site is within the Liverpool Bay Special Protection Area (SPA), designated for birds including wintering common scoter (*Melanitta nigra*), red-throated diver (*Gavia stellata*), little gull (*Hydrocoloeus minutus*), breeding common tern (*Sterna hirundo*), little tern (*Sternula albifrons*), and their supporting habitats.

Subtidal sand is dominant in the southern half of the MCZ and the benthic community is characterised by species ranging from a low-abundance bivalve-dominated community including *Corbula gibba*, *Chamelea striatula* and *Dosinia* sp., to a mixed polychaete and bivalve community which includes *Ophelia* sp., *Kurtiella bidentata* and *Glycera tridactyla* (EA 2015). The bivalve fauna also includes *Nucula nitidosa*, *Pharus legumen* and *Abra alba*. The site also includes important nursery and spawning grounds for several commercially important fish species including sole (*Solea solea*), plaice (*Pleuronectes platessa*) and whiting (*Merlangius merlangus*).

West of Copeland MCZ[61]

The site is located 25km off the coast of Cumbria and covers an area of 158km^2. Depths vary greatly across the site, from 5-10m in the north, to 25m in the centre of the site, to 100m in the south, and three broadscale habitats are protected, Subtidal coarse sediment, Subtidal sand and Subtidal mixed sediments. The site was designated in 2019 to address a shortfall of Subtidal sand in the MPA network, which was identified in this area using BGS data, and data

[60] Site description based on: https://designatedsites.naturalengland.org.uk/Marine/MarineSiteDetail.aspx?SiteCode=UKMCZ0007, Irish Sea Conservation Zones Regional Report: http://publications.naturalengland.org.uk/publication/1562384

[61] Site description based on: https://jncc.gov.uk/our-work/west-of-copeland-mpa/

from the Walney offshore wind farm extension, with distribution of the features further supported by a high-resolution habitat map generated from 2015 Eastern Irish Sea survey data.

5.3.2 Assessment

The conservation objectives of relevant sites and information on site selection and advice on operations have been considered against the work programme for the areas applied for to determine whether site conservation objectives could be hindered. The results are given in Table 5.6 below. All mandatory control requirements (Section 3.4), are assumed to be in place as a standard for all activities assessed.

Table 5.6: Consideration of potential physical disturbance and drilling effects and relevant site conservation objectives

West of Walney MCZ[62]
Site Information
Area (ha/km^2): 38,800/388 **Designated features**: Sea-pen and burrowing megafauna communities, Subtidal mud, Subtidal sand **Conservation objectives**: The conservation objective is that the protected habitats: • Are maintained in favourable condition if they are already in favourable condition • Be brought into favourable condition if they are not already in favourable condition For each protected feature, favourable condition means that, within the MCZ: • Its extent is stable or increasing • Its structure and functions, its quality, and the composition of its characteristic biological communities (including diversity and abundance of species forming part or inhabiting the habitat) are sufficient to ensure that its condition remains healthy and does not deteriorate. Any temporary deterioration in condition is to be disregarded if the habitat is sufficiently healthy and resilient to enable its recovery. Any alteration to a feature brought about entirely by natural processes is to be disregarded when determining whether a protected feature is in favourable condition.
Relevant Blocks with potential for physical disturbance and drilling effects
110/3b, 113/27c
Activities associated with the proposed work programmes within the relevant licence areas
Drilling of up to two wells involving - siting of rig, drilling discharges
Assessment of effects on site integrity
Rig siting (**Relevant pressures:** *penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion; physical change (to another sediment/seabed type), introduction or spread of non-indigenous species*) Advice on operations are not available for the site, however, based on other MCZs with similar broadscale features and habitats, they are all likely to be sensitive to the pressures listed above. Blocks 110/3b and 113/27c partly overlap the West of Walney MCZ, however, a considerable portion of both Blocks are also outside of the site boundaries. There is considerable potential that physical disturbance effects may be partly or completely avoided through rig site selection but this may not always be possible. The co-location area of the West of Walney MCZ with the West of Duddon Sands and Walney offshore wind farms covers the northern extent of Block 110/3b, such that rig siting in that area of the MCZ and Block, and related impacts, would be unlikely. This is due to rig safety zone requirements (500m), obstacle free clearance related to helicopter traffic (this could be several nautical miles, see Section 5.7 in BEIS 2022a), and the distance within which effects are assumed to

[62] https://designatedsites.naturalengland.org.uk/Marine/MarineSiteDetail.aspx?SiteCode=UKMCZ0045

occur from jack-up rig siting (also 500m) – cumulative effects are considered in Section 5.3.3. This is also partly the case for Block 113/27c, for which there is only a small overlap in the north east of West of Walney MCZ and the Block within which rig siting is likely, i.e. due to the presence of wind farm development and also the Rhyl gas field (see Figure 5.4).

Should a rig be located within the site, the maximum spatial footprint of the penetration and/or disturbance pressure associated with jack-up rig siting is small (0.8km^2, see Table 2.1) compared to the site (covering 0.2%). The placement of a rig within the site, should this occur, would result in temporary effects, though the habitats (e.g. sea-pens and burrowing megafauna) are noted to be particularly sensitive to physical disturbance pressures, and recovery of these habitats may take longer in contrast to coarser sediments typical of high wave- and current-energy areas. Gates & Jones (2012) looked at the recovery of benthic megafauna at a deep well site (380m) in the Norwegian Sea over a three year period and reported large burrows on the disturbed seabed, indicating activity of the decapod *Geryon* sp. in this area. The nearest burrow was 5m from the well indicating activity in this area in the three years since disturbance. Pennatulids are slow growing and may therefore take some time to recover from disturbance.

There may be a requirement for rig stabilisation depending on local seabed conditions; as noted above, any such stabilisation that would directly occur within the site would highly likely be limited to an area of Block 113/27c. In soft sediments, deposited rock may cover existing sediments resulting in a physical change (to another seabed type), and the protected features which have the potential to be impacted by rig siting are considered to be sensitive to this pressure, which assumes a permanent change of habitat. Should a rig be sited in the West of Walney MCZ and stabilisation material be required, the potential change of sediment/seabed type is small (estimated area of 0.001-0.004km^2 per rig siting, see Table 2.1), at up to 0.001% of the site area. The use of rock placement for rig stabilisation, which is not easily removed, would likely result in a localised but permanent change in habitat. Where possible, and subject to meeting the technical and safety requirements of rig placement at a particular location, removable mud mats or anti-scour mats could be used if drilling takes place within the site. Where this is not possible, the extent of rock placement should be minimised. In view of the very small scale of potential impact on the site, and the potential for mitigation both through rig site selection, or the use of methods to avoid a permanent change in habitat type, it is concluded that the licensing of Blocks listed above will not significantly hinder the achievement of the site's conservation objectives.

Management of the spread of non-native species from vessels and rigs is being progressed through international measures, and the risk is limited by the operational range of rigs on the UKCS.

Drilling discharges
(**Relevant pressures:** *abrasion/disturbance of the substrate on the surface of the seabed; habitat structure changes - removal of substratum (extraction*), *contaminants, smothering and siltation rate changes)*

The protected habitats and species of the site are sensitive to abrasion/disturbance of the seabed surface, siltation rate changes including smothering, contaminants (e.g. hydrocarbons) and habitat structure changes, removal of substratum (extraction) pressures associated with drilling discharges. Any discharge from exploration well drilling would be subject to risk assessment as part of existing regulatory controls (see Section 3.4.1). It is assumed that effects relating to drilling discharges occur within 500m of the well location (Table 2.1). As with the direct physical effect related to rig placement, the likely location of any rig, should it be within the site, is relatively confined to part of Block 113/27c. The maximum spatial footprint within which smothering by drilling discharges may occur (0.8km^2) is small (representing 0.2% of the total site area). As the feature lies in a relatively low energy environment, drill cuttings may not be removed by currents, and result in localised smothering, with a likely temporary effects. The Gates & Jones (2012) study referred to above notes that pennatulid density remained low for three years post-drilling in the visibly disturbed area i.e. the extent of the cuttings pile, and are slow growing such that they may take some time to recover. Studies on the reproduction of *Pennatula phosphorea* and *Funiculina quadrangularis* suggest that these species have lecithotrophic larvae which have the ability to remain in the water column until suitable habitat is located, thus possibly avoiding settlement on sediment disturbed by drilling mud and cuttings, however, they have been shown to be relatively resilient to smothering (Kinnear *et al.* 1996[63]). The small scale and temporary nature of potential smothering, as well as mandatory control requirements with respect to drilling chemical use and discharge (Section 3.4.1), are such that the achievement of the site conservation objectives will not be significantly hindered.

Cumulative effects

[63] As cited in Feature Activity Sensitivity Tool (FEAST) in relation to the "burrowed mud" habitat: https://www.marine.scotland.gov.uk/feast/

While there is the potential for a rig to be sited in Blocks 110/3b and 113/27c such that intra-plan cumulative effects are possible, the likely spatial restrictions on rig siting across the Blocks referred to above are such that the spatial footprints associated with rig installation and drilling discharges are unlikely to overlap either spatially or temporally, or act cumulatively to generate additional effects that could hinder the conservation objectives of the site being achieved. Section 5.3.3 provides a consideration of potential cumulative effects with other projects.

Conclusion
The siting of a rig and related discharges in Blocks 110/3b and 113/27c will not hinder the achievement of the West of Walney MCZ site conservation objectives.

Fylde MCZ[64]

Site Information

Area (ha/km²): 26,060/261
Designated features: Subtidal sand, subtidal mud

Conservation objectives:
The conservation objective is that the protected habitats:

- Are maintained in favourable condition if they are already in favourable condition
- Be brought into favourable condition if they are not already in favourable condition

For each protected feature, favourable condition means that, within the MCZ:

- Its extent is stable or increasing
- Its structure and functions, its quality, and the composition of its characteristic biological communities (including diversity and abundance of species forming part or inhabiting the habitat) are sufficient to ensure that its condition remains healthy and does not deteriorate.

Any temporary deterioration in condition is to be disregarded if the habitat is sufficiently healthy and resilient to enable its recovery.

Any alteration to a feature brought about entirely by natural processes is to be disregarded when determining whether a protected feature is in favourable condition.

Relevant Blocks with potential for physical disturbance and drilling effects

110/3b

Activities associated with the proposed work programmes within the relevant licence areas

Drilling of one well involving - siting of rig, drilling discharges

Assessment of effects on site integrity

Rig siting
(**Relevant pressures:** *penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion; physical change (to another sediment/seabed type), introduction or spread of non-indigenous species*)

Block 110/3b is located 1.9km to the west of Fylde MCZ, and direct physical impacts on any of the site's protected features are not considered to be possible noting the assumed distance from a jack-up rig within which effects may occur (500m, see Table 2.1).

Management of the spread of non-native species from vessels and rigs is being progressed through international measures, and the risk is limited by the operational range of rigs on the UKCS.

Drilling discharges
(**Relevant pressures:** *abrasion/disturbance of the substrate on the surface of the seabed; habitat structure changes - removal of substratum (extraction*), *contaminants, smothering and siltation rate changes)*

The advice on operations indicates that the relevant qualifying features are sensitive to the above pressures, most of which relate to seabed disturbance and habitat changes associated with smothering by drill cuttings near the well location, and that these cuttings can accumulate in piles where currents are generally weak. It is assumed that effects relating to drilling discharges occur within 500m of the well location (Table 2.1), therefore,

[64] https://designatedsites.naturalengland.org.uk/Marine/MarineSiteDetail.aspx?SiteCode=UKMCZ0007

drilling discharges will not impact the extent, structure, and function of the protected habitats as the site is 1.9km away from Block 110/3b.

Cumulative effects
Intra-plan cumulative effects are not considered to be possible as only Block 110/3b was identified as relevant to the assessment and only one related work programme has been proposed. Section 5.3.3 provides a consideration of potential cumulative effects with other projects.

Conclusion
The siting of a rig and related discharges in Block 110/3b will not hinder the achievement of the Fylde MCZ site conservation objectives.

West of Copeland MCZ[65]

Site Information

Area (ha/km²): 26,060/261
Designated features: Subtidal sand, subtidal mud

Conservation objectives:
The conservation objective is that the protected habitats:

- Are maintained in favourable condition if they are already in favourable condition
- Be brought into favourable condition if they are not already in favourable condition

For each protected feature, favourable condition means that, within the MCZ:

- Its extent is stable or increasing
- Its structure and functions, its quality, and the composition of its characteristic biological communities (including diversity and abundance of species forming part or inhabiting the habitat) are sufficient to ensure that its condition remains healthy and does not deteriorate.

Any temporary deterioration in condition is to be disregarded if the habitat is sufficiently healthy and resilient to enable its recovery.

Any alteration to a feature brought about entirely by natural processes is to be disregarded when determining whether a protected feature is in favourable condition.

Relevant Blocks with potential for physical disturbance and drilling effects

113/27c

Activities associated with the proposed work programmes within the relevant licence areas

Drilling of one well involving - siting of rig, drilling discharges

Assessment of effects on site integrity

Rig siting
(**Relevant pressures:** *penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion; physical change (to another sediment/seabed type), introduction or spread of non-indigenous species*)

Block 113/27c overlaps a small area in the east of the West of Copeland MCZ. Most of this area is occupied by the Walney extension offshore wind farm, likely precluding rig placement in much of the area where the Block overlaps the site, due to rig safety zone requirements, and obstacle free areas required for helicopter approaches (see Section 5.7 of BEIS 2022a and Section 5.3.3 below). The potential area within which a rig could be sited largely coincides with an area of subtidal sand, and also some subtidal mixed sediment[66]. The area of disturbance related to jack-up rig siting is 0.8km² which would represent a limited (0.3% site area) and temporary impact on the site. There may be a requirement for rig stabilisation depending on local seabed conditions. In soft sediments, deposited rock may cover existing sediments resulting in a physical change (to another seabed type), and the protected features which have the potential to be impacted by rig siting are considered to be sensitive to this pressure, which assumes a permanent change of habitat. The potential area of change in sediment/seabed type from rig stabilisation is small (estimated at 001-0.004km² per rig siting, see Table 2.1), representing 0.002% of the site area. There is considerable scope for any rig to be located outside of the site

[65] https://jncc.gov.uk/our-work/west-of-copeland-mpa/
[66] https://hub.jncc.gov.uk/assets/c240f828-7c7b-49d2-b550-308c1ff302fb#JNCC-T3-MCZ-PostConsultationAdvice-v3.0.pdf

boundaries, though should a rig need to be placed within the site, any impact would be small scale, temporary, and would not significantly hinder the conservation objectives of the site being achieved.

Management of the spread of non-native species from vessels and rigs is being progressed through international measures, and the risk is limited by the operational range of rigs on the UKCS.

Drilling discharges
(**Relevant pressures:** *abrasion/disturbance of the substrate on the surface of the seabed; habitat structure changes - removal of substratum (extraction*), *contaminants, smothering and siltation rate changes)*

Any discharge from exploration well drilling would be subject to risk assessment as part of existing regulatory controls (see Section 3.4.1). The advice on operations indicates that the protected features are sensitive to the above pressures. It is assumed that effects relating to drilling discharges occur within 500m of the well location (Table 2.1). For those areas of Block 113/27c which are located entirely outside of the site, drilling discharges will not significantly impact the extent, structure, or function of the protected features. For the areas of the Block within the site, the maximum spatial footprint within which smothering by drilling discharges and associated habitat structure changes may occur (0.8km^2) is small (representing 0.3% of the total site area) and temporary. Therefore, drilling discharges will not significantly hinder the achievement of the site's conservation objectives.

Cumulative effects
Intra-plan cumulative effects are considered to be unlikely as only Block 113/27c was identified as relevant to the assessment. Section 5.3.3 provides a consideration of potential activities cumulatively with other relevant plans and projects.

Conclusion
The siting of a rig in 113/27c will not hinder the achievement of the West of Copeland MCZ site conservation objectives.

5.3.3 Cumulative effects

There are a number of potential interactions between activities that may follow licensing and those existing or planned activities, for instance in relation to renewable energy, offshore oil and gas and gas storage (including carbon dioxide storage), fishing, and aggregate extraction. These activities are subject to individual permitting or consenting mechanisms or are otherwise managed at a national level. Interactions were identified on the basis of the nature and location of existing or proposed activities and spatial datasets in a GIS. Projects relevant to this in-combination effects assessment, along with their status and relevant sites are tabulated in Table 5.7.

The Blocks applied for are within the North West Inshore and Offshore Marine Plan areas. The North West Marine Plans include policies of relevance to seaward oil and gas licensing, including NW-CO-1 and NW-OG-1/OG-2 which indicate a preference for projects that optimise their use of space and consider co-existence opportunities, and safeguard existing seaward oil and gas licences and future discoveries from new proposals respectively.

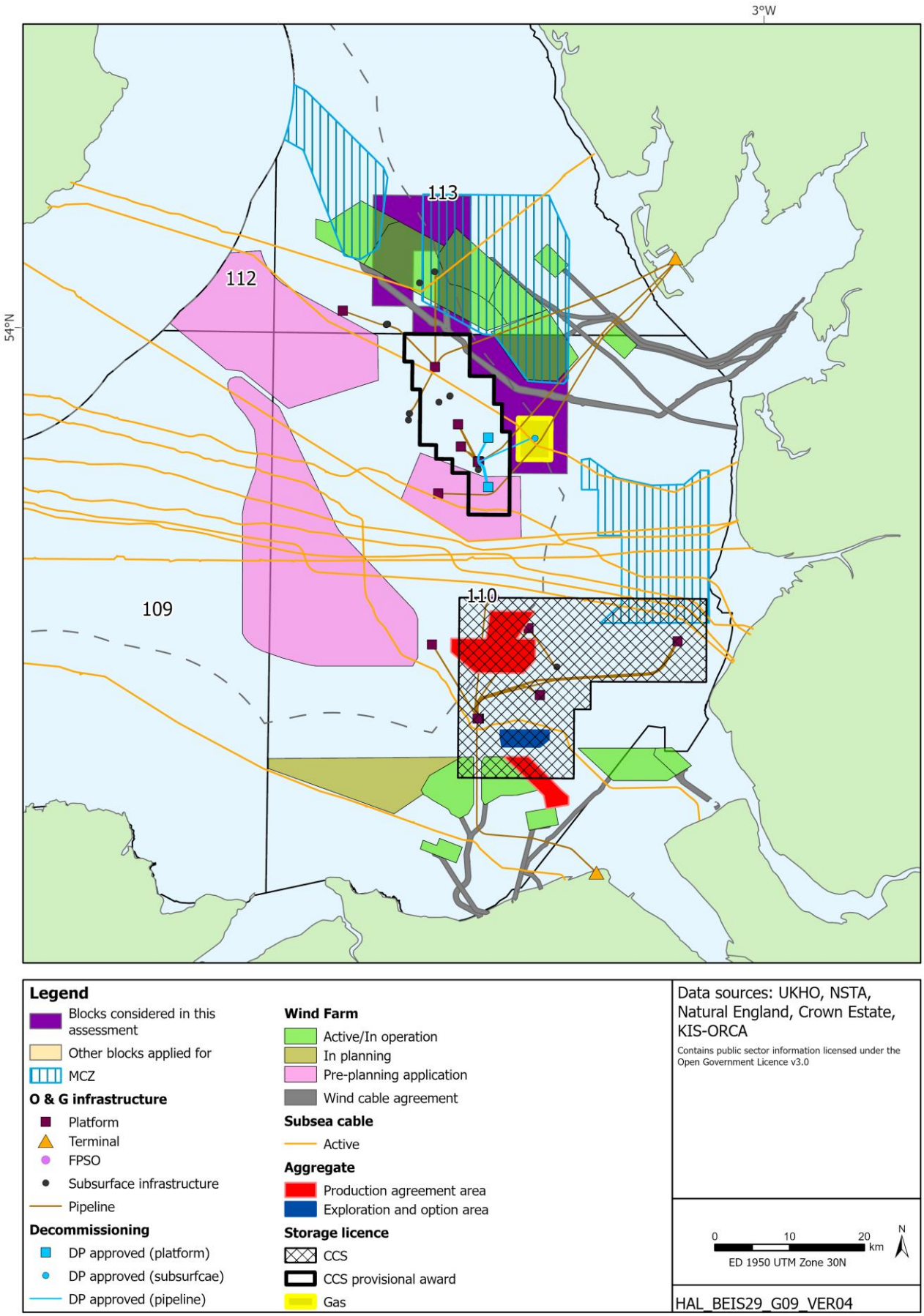
Table 5.7: Projects relevant to the cumulative effects assessment for the eastern Irish Sea

Relevant project	Project summary	Project status/indicative timing	Relevant sites[1]
Walney offshore wind farm	Located approximately 14km from the Cumbrian coast, the project area contains 101 turbines with an overall installed capacity of 367MW. The export cable landfalls are near Heysham and Fleetwood.	In-operation	West of Walney MCZ

Relevant project	Project summary	Project status/indicative timing	Relevant sites[1]
Walney extension offshore wind farm	Located approximately 19km from the Cumbrian coast, and to the north west of the Walney I and II windfarms, the extension is due to have an installed capacity of 659MW generated from 87 turbines. The export cables are routed to the south of the Walney and West of Duddon Sands wind farms with a landfall near Heysham.	In-operation	West of Walney MCZ, West of Copeland MCZ
West of Duddon Sands offshore wind farm	West of Duddon Sands is located approximately 14km offshore, and contains 108 turbines, with an overall installed capacity of 389MW. The export cable landfall is at Heysham.	In-operation	West of Walney MCZ
Ormonde offshore wind farm	Located approximately 9km offshore, the wind farm contains 30 wind turbines, a sub-station, meteorological mast and inter-array cabling, with an installed capacity of 150MW.	In-operation	West of Walney MCZ
Carbon Storage Licence CS004	The carbon storage licence was awarded in 2020 for an appraisal period of six years, with site characterisation due to be completed by 2023.	Pre-planning	Fylde MCZ
Bains gas storage licence	A gas storage licence was applied for in June 2022 covering the depleted Bains gas storage field. No other details of the proposed work programme are known.	Pre-planning	Fylde MCZ
Pipelines related to the Morecambe and North Morecambe gas fields	North Morecambe 36" pipeline, South Morecambe 36" pipeline, Rhyl control umbilical and flexible export pipeline, Rhyl North subsea wellheads.	In-operation	West of Waney MCZ
33rd seaward oil & gas licensing round	Two Blocks in the Irish Sea (110/3b, 113/27c) have been applied for and are relevant to the assessment. Activities as part of their work programmes include the drilling of wells.	Areas have been applied for and are not yet licensed.	West of Walney MCZ, Fylde MCZ
Round 4 wind preferred projects (export cables)	The route of any export cable associated with these projects is uncertain. The assessment is informed by the Round 4 MCZ assessment.	Pre-planning	West of Walney MCZ, Fylde MCZ, West of Copeland MCZ

Sources: NSTA carbon storage public register (https://www.nstauthority.co.uk/licensing-consents/carbon-storage/),), TCE Open Data Portal (https://thecrownestate.maps.arcgis.com/apps/webappviewer/index.html?id=b7f375021ea845fcabd46f83f1d48f0b, BEIS oil & gas: decommissioning of offshore installations and pipelines (https://www.gov.uk/guidance/oil-and-gas-decommissioning-of-offshore-installations-and-pipelines)
Notes: [1] those sites considered to be relevant to 33rd round exploration activities.

Figure 5.4: Location of blocks applied for in relation to other projects in the eastern Irish Sea



Physical disturbance and drilling effects

The features protected by West of Walney MCZ, Fylde MCZ and West of Copeland MCZ are benthic habitats, and are therefore only considered to be sensitive to those physical effects related to the work programme for the Irish Sea Blocks 110/3b and 113/27c, as already assessed in relation to the sites in Section 5.3.2. The conclusions of that section are considered here in the context of those relevant projects identified in Table 5.7 above.

The Ormonde, West of Duddon Sands, Walney and Walney extension wind farms are located within the West of Walney MCZ. These projects were consented and/or completed at the time the site was designated, and the southern portion of the site was co-located with these projects (Irish Sea Conservation Zones 2011). The SACO for the MCZ notes that post-construction surveys of the Walney wind farms indicate sediments have become muddier in the site, which may be the result of a combination of natural factors and the presence of the wind farm. In addition to wind farms, some historical disturbance to the site has occurred from the installation of gas field pipelines, including the South Morecambe and North Morecambe export pipelines, and the pipelines and umbilicals associated with the Rhyl field. The SACO notes that the protected features are sensitive to fisheries, and in particular *Nephrops* fisheries and the regular use of bottom towed fishing gear in the site. A 2018 bylaw prohibits the use of bottom towed gear across most of the MCZ other than under licence, which should have made significant progress in reducing this fisheries pressure. While the target for the attributes relating to the distribution of the site's protected features is to recover the presence and spatial distribution of the features, in view of the limited scale and duration of effects that would be associated with the drilling of a well in those parts of Blocks 110/3c and 113/27c that a rig could be sited, and their temporary effect, it is not considered that licensing the Blocks would result in cumulative effects which could hinder the achievement of the site's conservation objectives.

The Fylde MCZ is not subject to significant pressures from activities involving physical disturbance in the eastern Irish Sea, including energy related infrastructure and aggregates extraction, and so it is not considered possible for any cumulative effects with these activities and the licensing of Block 110/3b to occur. Carbon Storage licence area CS004 overlaps the southern portion of the site. As noted in Table 5.7, the appraisal work programme covered by this licence should be complete in 2023, and therefore, any potential temporal overlap with activities associated with Block 110/3b is not expected. Hynet North West, to which CS004 relates, is one of the Track-1 clusters associated with the Government's programme to deploy Carbon Capture Usage and Storage in a minimum of two industrial clusters by the mid-2020s and four by 2030, however, the nature and timing of any subsequent carbon dioxide storage within CS004 is not yet known. The SACO does not provide any further evidence for anthropogenic activities which are affecting the site, though it is likely that fisheries will be exerting some pressure. In view of the location of Block 110/3b relative to the site (at least 1.9km away), the distance within which effects are predicted to occur from the siting of a rig and any related discharges (500m), and their temporary effect, it is not considered that the licensing of Block 110/3b would result in cumulative effects which could significantly hinder the achievement of the site's conservation objectives.

The southern extent of West of Copeland MCZ, like West of Walney MCZ, is occupied in part by the Walney extension offshore wind farm. The remaining part of the site is not subject to significant pressures from activities involving physical disturbance, including energy related infrastructure and aggregates extraction (also see the consideration of Round 4 wind below). The SACO contains little supporting information on the ongoing pressures affecting the site,

however, JNCC (2018) indicate that the intensity of fisheries pressures on the Subtidal coarse sediment and Subtidal mixed sediments are such that restore objectives have been set for these. While there is the potential for cumulative effects to occur with those activities mentioned above should an exploration well be drilled in Block 113/27c, the scale and temporary nature of those effects are such that the conservation objectives of the site will not be significantly hindered. Additionally, the temporary siting of a drilling rig within the site would exclude fisheries from an area of at least equal to the area within which physical effects are assumed to occur from exploration well drilling.

It is not considered that any of the Round 4 preferred projects have the potential to act cumulatively with the licensing of Blocks 110/3b and 113/27c such that the conservation objectives of the West of Walney MCZ, Fylde MCZ or West of Copeland MCZs would be hindered, as there is no spatial overlap between the Blocks applied for, the Round 4 preferred projects, and the sites, and also a likely lack of any temporal overlap. An MCZ assessment undertaken as part of the Round 4 process (NIRAS 2022) included a consideration of cable route regions for each of the projects. The assessment noted that a meaningful assessment of export cabling could not be undertaken and that the results of the assessment were therefore indicative, and inferred the potential outcome of project level assessment, should interactions with relevant MCZs occur. It was concluded that, provided a number of interventions could be realised (a set of high level mitigation measures related to risk scores assigned to site features), that there would be no significant risk of Round 4 hindering the achievement of the conservation objectives for the MCZs screened into the assessment, which included West of Walney and Fylde MCZs. For West of Copeland, no specific mitigation was identified, though it was recommended that developers undertake their activities in line with industry best practice.

One area has been applied for in the 1st Carbon Dioxide Storage Licensing Round[67] (EIS Area 1) which is close to the sites considered in this assessment (750m from West of Walney, 9.5km from Fylde, 11.7km from West of Copeland). Activities associated with the work programme for this area covers the initial/exploration term of the licence, and is analogous to the activities covered in this assessment which relate to the initial terms of seaward petroleum licences. In view of the distance between EIS Area 1 and the relevant Irish Sea sites, the conclusions set out in Section 5.3.2 and those above in relation to other projects, and the likely spatial and temporal separation of activities, it is not considered possible that the licensing of EIS Area 1, cumulatively with Blocks 110/3b and 113/7c, would hinder the achievement of the site's conservation objectives. While cover parts of the West of Walney MCZ, the area of 110/3b that covers the site also covers the West of Duddon Sands offshore wind farm, and so placement of a rig within this area is highly unlikely and cumulative effects and not considered possible.

Therefore it is concluded that none of the potential cumulative effects identified in relation to Blocks 110/3b and 113/27c would hinder the conservation objectives of West of Walney MCZ, Fylde MCZ or West of Copeland MCZ being achieved.

[67] https://www.gov.uk/guidance/offshore-energy-strategic-environmental-assessment-sea-an-overview-of-the-sea-process#appropriate-assessment

6 Conclusion

It is concluded that the licensing of the 258 Blocks applied for in the 33rd Seaward Oil and Gas Licensing Round, and in particular the 82 Blocks screened in for detailed assessment, will not significantly hinder the achievement of the conservation objectives of relevant MCZs or MPAs.

Even where a site/protected feature has been screened out, or where it has been concluded that the Block licensing will not hinder the conservation objectives of a site being achieved at plan level, the potential for significant effects on any relevant site would need to be revisited at the project level, once project plans are known, and as part of project specific consenting. New relevant site designations, extensions or the addition of protected features, new information on the nature and sensitivities of protected features within sites, and new information about effects including cumulative effects, may be available to inform such future assessments.

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Appendix A – The Designated Sites

The following tables list the sites relevant to each regional area covered in this assessment and their protected features. The sources of site data were the JNCC[68], Natural England[69], NatureScot[70] and Historic Environment Scotland[71] websites. These sites are mapped against the Blocks applied for in the 33rd Seaward Licensing Round in Figure 2.1 to Figure 2.3.

Table A.2: Relevant sites and their designated features

Site Name	Area (ha)	Designated features
WEST OF SHETLAND, NORTHERN AND CENTRAL NORTH SEA		
North-east Faroe Shetland Channel MPA	2,368,200	Quaternary of Scotland, Submarine Mass Movement, Cenozoic Structures of the Atlantic Margin, Continental slope, Deep sea sponge aggregations, Marine Geomorphology of the Scottish Deep Ocean Seabed, Offshore deep sea muds, Offshore subtidal sands and gravels
Faroe-Shetland Sponge Belt MPA	527,800	Continental slope, Deep sea sponge aggregations, Marine Geomorphology of the Scottish Deep Ocean Seabed, Offshore subtidal sands and gravels, Submarine Mass Movement, Quaternary of Scotland, Ocean quahog aggregations (*Arctica islandica*)
Fetlar to Haroldswick MPA	21,600	Black guillemot (*Cepphus grylle*), Horse mussel beds, Maerl beds, Shallow tide-swept coarse sands with burrowing bivalves, Circalittoral sand and coarse sediment communities, Kelp and seaweed communities on sublittoral sediment, Marine Geomorphology of the Scottish Shelf Seabed
Mousa to Boddam MPA	1,300	Marine Geomorphology of the Scottish Shelf Seabed, Sandeels (*Ammodytes marinus*/*Ammodytes tobianus*)
Out Skerries HMPA	-	Wrecks of the *Kennemerland* and *Wrangels Palais.*
North-west Orkney MPA	436,500	Marine Geomorphology of the Scottish Shelf Seabed, Sandeels (*Ammodytes* marinus/*Ammodytes tobianus*)
Papa Westray MPA	3,300	Marine Geomorphology of the Scottish Shelf Seabed, Black guillemot (*Cepphus grylle*)
Wyre and Rousay Sounds MPA	1,600	Kelp and seaweed communities on sublittoral sediment, Marine Geomorphology of the Scottish Shelf Seabed, Maerl beds
West Shetland Shelf MPA	408,300	Offshore subtidal sands and gravels
Central Fladen MPA	92,500	Burrowed mud, Quaternary of Scotland
Noss Head MPA	800	Horse mussel beds
East Caithness Cliffs MPA	11,400	Black guillemot (*Cepphus grylle*)
Southern Trench MPA	239,800	Burrowed mud, Shelf deeps, Fronts, Submarine Mass Movement, Quaternary of Scotland, Minke whale (*Balaenoptera acutorostrata*)
Turbot Bank MPA	25,100	Sandeels (*Ammodytes marinus*/*Ammodytes tobianus*)
Norwegian Boundary Sediment Plain MPA	16,400	Offshore subtidal sands and gravels, Ocean quahog aggregations (*Arctica islandica*)
East of Gannet and Montrose Fields MPA	183,900	Offshore subtidal sands and gravels, Offshore deep sea muds, Ocean quahog aggregations (*Arctica islandica*)
Swallow Sand MCZ	474,600	Subtidal coarse sediment, Subtidal sand, North Sea glacial tunnel valley (Swallow Hole)
Fulmar MPA	243,700	Subtidal sand, Subtidal mud, Subtidal mixed sediments, Ocean quahog (*Arctica islandica*)

[68] https://jncc.gov.uk/our-work/marine-conservation-zones/

[69] https://designatedsites.naturalengland.org.uk/

[70] https://sitelink.nature.scot/home

[71] http://portal.historicenvironment.scot/

Site Name	Area (ha)	Designated features
SOUTHERN NORTH SEA		
Farnes East MCZ	94,500	Moderate energy circalittoral rock, Subtidal coarse sediment, Subtidal sand, Subtidal mud, Subtidal mixed sediments, Sea-pen and burrowing megafauna communities, Ocean quahog (*Arctica islandica*)
Berwick to St Mary's MCZ	63,423	Common eider (*Somateria mollissima*)
Aln Estuary MCZ	39	Coastal saltmarshes and saline reedbeds, Intertidal mud, Estuarine rocky habitats, Sheltered muddy gravels
Coquet to St Mary's MCZ	19,188	High energy infralittoral rock, High energy intertidal rock, Intertidal coarse sediment, Intertidal mixed sediments, Intertidal mud, Intertidal sand and muddy sand, Intertidal under boulder communities, Low energy intertidal rock, Moderate energy circalittoral rock, Moderate energy infralittoral rock, Moderate energy intertidal rock, Peat and clay exposures, Subtidal coarse sediment, Subtidal mixed sediments, Subtidal mud, Subtidal sand
North East of Farnes Deep MCZ	49,200	Subtidal coarse sediment, Subtidal sand, Subtidal mixed sediments, Subtidal mud, Ocean quahog (*Arctica islandica*)
North East of Farnes Deep pilot HPMA	49,200	Subtidal coarse sediment, Subtidal sand, Subtidal mixed sediments, Subtidal mud, Ocean quahog (*Arctica islandica*) – note that the features to be subject to protection will be set out in the designation order for the site.
Holderness Inshore MCZ	30,887	High energy circalittoral rock, Intertidal sand and muddy sand, Moderate energy circalittoral rock, Subtidal coarse sediment, Subtidal mixed sediments, Subtidal mud, Subtidal sand, Spurn Head (Subtidal; geomorphological interest feature)
Holderness Offshore MCZ	117,600	Subtidal coarse sediment, Subtidal sand, Subtidal mixed sediments, Ocean quahog (*Arctica islandica*); North Sea glacial tunnel valleys (geological interest feature)
Markham's Triangle MCZ	20,000	Subtidal coarse sediment, Subtidal sand, Subtidal mud, Subtidal mixed sediments
Cromer Shoal Chalk Beds MCZ	32,048	High energy circalittoral rock, High energy infralittoral rock, Moderate energy circalittoral rock, Moderate energy infralittoral rock, North Norfolk coast (Subtidal), Peat and clay exposures, Subtidal chalk, Subtidal coarse sediment, Subtidal mixed sediments, Subtidal sand
EASTERN IRISH SEA		
Cumbria Coast MCZ	1,800	High energy intertidal rock, Honeycomb worm (*Sabellaria alveolata*) reefs, Intertidal biogenic reefs, Intertidal sand and muddy sand, Intertidal under boulder communities, Moderate energy infralittoral rock, Peat and clay exposures, Razorbill (*Alca torda*)
West of Copeland MCZ	15,800	Subtidal coarse sediment, Subtidal sand, Subtidal mixed sediments
West of Walney MCZ	38,800	Sea-pen and burrowing megafauna communities, Subtidal mud, Subtidal sand
Fylde MCZ	26,060	Subtidal sand, subtidal mud
Wyre-Lune MCZ	9,231	Smelt (*Osmerus eperlanus*)
Ribble Estuary MCZ	1,544	Smelt (*Osmerus eperlanus*)

Appendix B – Blocks Applied For

3/10c	3/14f	3/15f	3/19d	3/20c	9/1	9/2d	9/9f	9/10a	9/12d
9/14c	9/15d	9/18f	12/25	13/21c	13/22c	13/23a	14/15	14/20d	14/23
14/24	14/26c	14/27	14/28	14/29	14/30	15/11	15/12	15/13c	15/17b
15/18a	15/18c	15/19a	15/22b	15/23b	15/27a	15/28a	15/29d	16/3d	16/8b
16/13b	16/22b	20/1b	20/2d	20/3	20/6d	20/7d	20/8c	20/28	20/29
20/30	21/1b	21/2a	21/6a	21/7b	21/25c	21/26b	21/30g	22/9b	22/10b
22/12b	22/15c	22/21d	22/23c	22/24f	22/25e	22/26e	22/27	22/28b	22/29b
22/30d	23/6	23/11b	23/16d	23/16e	23/17	23/21b	23/26c	28/2b	28/7
28/12	29/1c	29/2a	29/3b	29/4b	29/5a	29/7b	29/10c	29/15	29/16
29/17	29/18	29/19	29/21	29/22	29/23	29/27	29/28	30/1a	30/2b
30/2e	30/3c	30/6c	30/11c	30/13b	30/16g	36/14	36/15	36/19	36/20
36/30c	37/11	37/16	37/26	37/27	41/10b	41/15	42/2b	42/3	42/4
42/5c	42/6	42/7a	42/8	42/11	42/12b	42/14	42/15b	42/28j	42/30b
43/2b	43/3b	43/4b	43/9	43/12a	43/13	43/14	43/17	43/18	43/19d
43/20c	43/21	43/22c	43/24c	43/25	43/26b	43/29	43/30	44/13	44/16
44/17	44/18a	44/19b	44/21	44/22	44/23a	44/27	47/3j	47/3k	47/4d
47/5b	47/7b	47/8a	47/9a	47/10c	47/13	47/14	47/15	47/20	48/1
48/2b	48/6c	48/10	48/11b	48/12a	48/14d	48/15b	48/16	48/17d	48/18c
48/20c	48/21	48/22a	48/23c	48/24	48/25d	48/28b	48/30c	49/11b	49/16d
49/21b	49/21d	49/25b	49/26b	49/29	49/30b	50/21	50/26	52/5c	53/2c
53/3	53/4	53/5c	110/3b	113/27c	204/20d	205/1b	205/2b	205/3	205/6
205/7	205/14	206/2	206/11d	208/1	208/6	208/11	208/12b	208/13b	208/17
208/18b	208/26	211/11	211/16b	211/27	211/28	213/10	213/14	213/15	213/19
213/20	213/23	213/24	213/25	213/28	213/29	213/30	214/4a	214/5	214/6
214/7	214/8	214/9	214/10	214/11	214/12b	214/13b	214/14a	214/15	214/16
214/21	214/22	214/23	214/24	214/26	214/27	214/28a	214/29a		

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