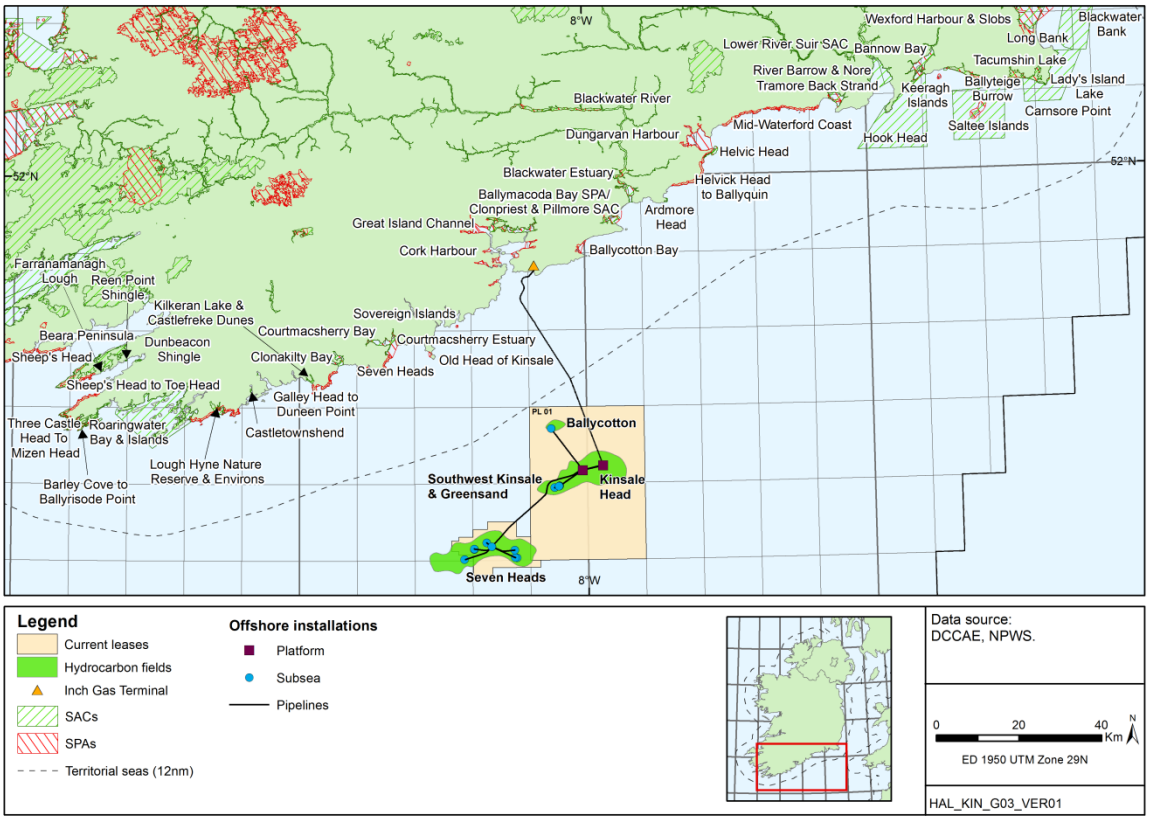
PSE Kinsale Energy Limited

Kinsale Alpha and Bravo Platforms Shallow Geological Survey



Appropriate Assessment Screening Report

March 2020

Rev: Issue

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1 INTRODUCTION

PSE Kinsale Energy Limited (Kinsale Energy) is applying for consent to undertake survey activities at the Kinsale Alpha (KA) and Bravo (KB) platforms in petroleum lease area No.1 covering Blocks 48/20, 48/25, 49/16 and 49/21 in the North Celtic Sea Basin. The KA and KB platforms are located off the coast of Co. Cork, approximately 47km and 45km from the nearest landfall respectively (Figure 1.1).

Discovery of the Kinsale Head area gas reserves were made by Marathon Oil in 1971, and production commenced in 1978 following the installation of the KA and KB platforms. Subsequent discoveries were made in the Kinsale Head area including Ballycotton, Southwest Kinsale and the Seven Heads fields and developed as subsea tie-backs to the Kinsale Head platforms.

1.1 Background and document purpose

Kinsale Energy is preparing for the decommissioning of the Kinsale Area gas fields and facilities which are coming to the end of their productive life, and in keeping with lease obligations have prepared Decommissioning Plans and related Environmental Impact Assessment Report (EIAR) and Appropriate Assessment (AA) screening reports, which have been submitted to the Petroleum Affairs Division (PAD) of the Department of Communications, Climate Action & Environment (DCCAE). To inform the detailed removal procedures for the platform jackets, a survey is proposed to confirm the shallow seabed conditions in the immediate vicinity of the platforms. The survey will include the use of acoustic equipment (e.g. sub-bottom profiler) to detect the depth of surficial sediments and their contact with the underlying bedrock to inform the need for any excavation around the jacket piles required during jacket removal (more detail is provided in Section 2).

1.2 Legislative background and AA process

The development and administration of policy in relation to exploration and production of Ireland's petroleum resources is the responsibility of the Petroleum Affairs Division (PAD) of the Department of Communications, Climate Action and Environment. The Department is also responsible for environmental regulation and monitoring of offshore developments.

The EU Habitats Directive (92/43/EEC) requires that Member States contribute to the creation of a coherent ecological network of sites through the identification and designation of Special Areas of Conservation (SAC) relating to those habitats and species listed in Annex I and Annex II of the Directive respectively. The EU Birds Directive (2009/147/EC) requires the protection of bird species listed in Annex I of that Directive, and regularly occurring migratory species, including the use of conservation measures through the designation of Special Protection Areas (SPAs). SACs and SPAs are collectively part of the Natura 2000 network. The relevant conservation agencies responsible for site selection designate sites on the basis of the presence of relevant qualifying habitats and species, and conservation objectives are set to maintain or, where relevant, restore, the features to a favourable conservation status. The requirements of the *EC Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora* (the "Habitats and Species Directive")*;* and *EC Council Directive 2009/147/EC* (the "Bird Directive") have been implemented through the *European Communities (Birds and Natural Habitats) Regulations 2011* (as amended)*.*

Article 6(3) of the Habitats Directive indicates that, "*Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4*[1]*, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public*."

The Competent Authority (in this case the Petroleum Affairs Division of the Department of Communications, Climate Action & Environment) must therefore undertake an AA where likely significant effects are identified for qualifying interests of a relevant site from activities not directly connected with the management of the site. This requirement and the process by which such a consideration is made, is outlined in the *European Communities (Birds and Natural Habitats) Regulations 2011*, and in guidance at a European (European Commission 2019) and national (DoEHLG 2010) level. The key stages of the AA process are listed below and shown in Figure 1.2.

Stage 1: Screening for appropriate assessment. To assess, in view of best scientific knowledge, and in view of relevant site conservation objectives, if the project, individually or in-combination with another plan or project, is likely to have a significant effect on any Natura 2000 site.

Stage 2: Appropriate Assessment. Required if it cannot be excluded, on the basis of objective information, that the project, individually or in-combination with other plans or projects, will not have a significant effect on a Natura 2000 site. Where there are adverse impacts, an assessment of the potential mitigation of those impacts. The appropriate assessment must include a final determination by the competent authority as to whether or not a proposed development would adversely affect the integrity of a Natura 2000 site. In order to reach a final determination, the consenting authority must undertake examination, analysis and evaluation, followed by findings, conclusions and a final determination. The appropriate assessment must contain complete, precise and definitive findings and conclusions, and may not have lacunae or gaps.

Stage 3: Assessment of alternative solutions. This process examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the Natura 2000 site.

Stage 4: Assessment where no alternative solutions exist and where adverse impacts remain. An assessment of compensatory measures where, in the light of an assessment of imperative reasons of overriding public interest (IROPI), it is deemed that the project or plan should proceed.

As the project is not directly connected with the management of a Natura 2000 site, a screening exercise (Stage 1) has been undertaken to consider the potential for likely significant effects to arise in relation to Natura 2000 sites from activities associated with the proposed survey scope as defined in Section 2, including in-combination with other plans or programmes. The approach taken to screening has been to:

[1] Article 6(4) relates to plans or projects which must be undertaken despite identification of an assessment determining a negative effect on a given site due to imperative reasons of overriding public interest (IROPI), including those of a social or economic nature. Suitable compensatory measures are required to maintain the coherence of the network should such a case be made.

- Define the location and nature of the proposed activities, together with their potential to result in likely significant effects on European sites
- Identify all relevant European sites and their qualifying interests with the potential to be affected by the proposed survey activities
- Screen the relevant sites for the likelihood of significant effects that could result from the activities, based on the nature and scale of potential effects, including in-combination with other marine activities
- Conclude whether likely significant effects have been identified

Figure 1.1: Location of the Kinsale Alpha & Bravo platforms and wider Kinsale Area

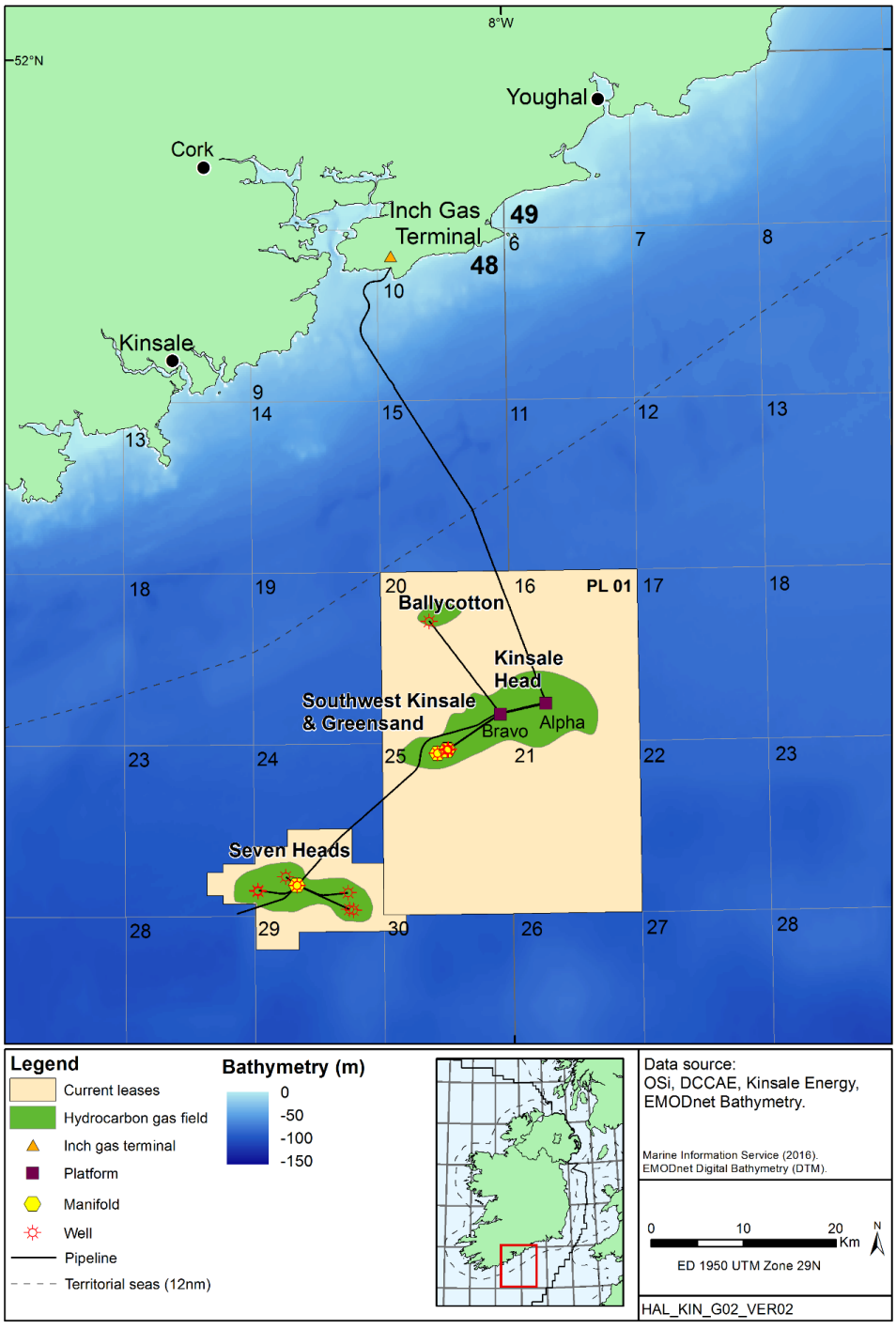
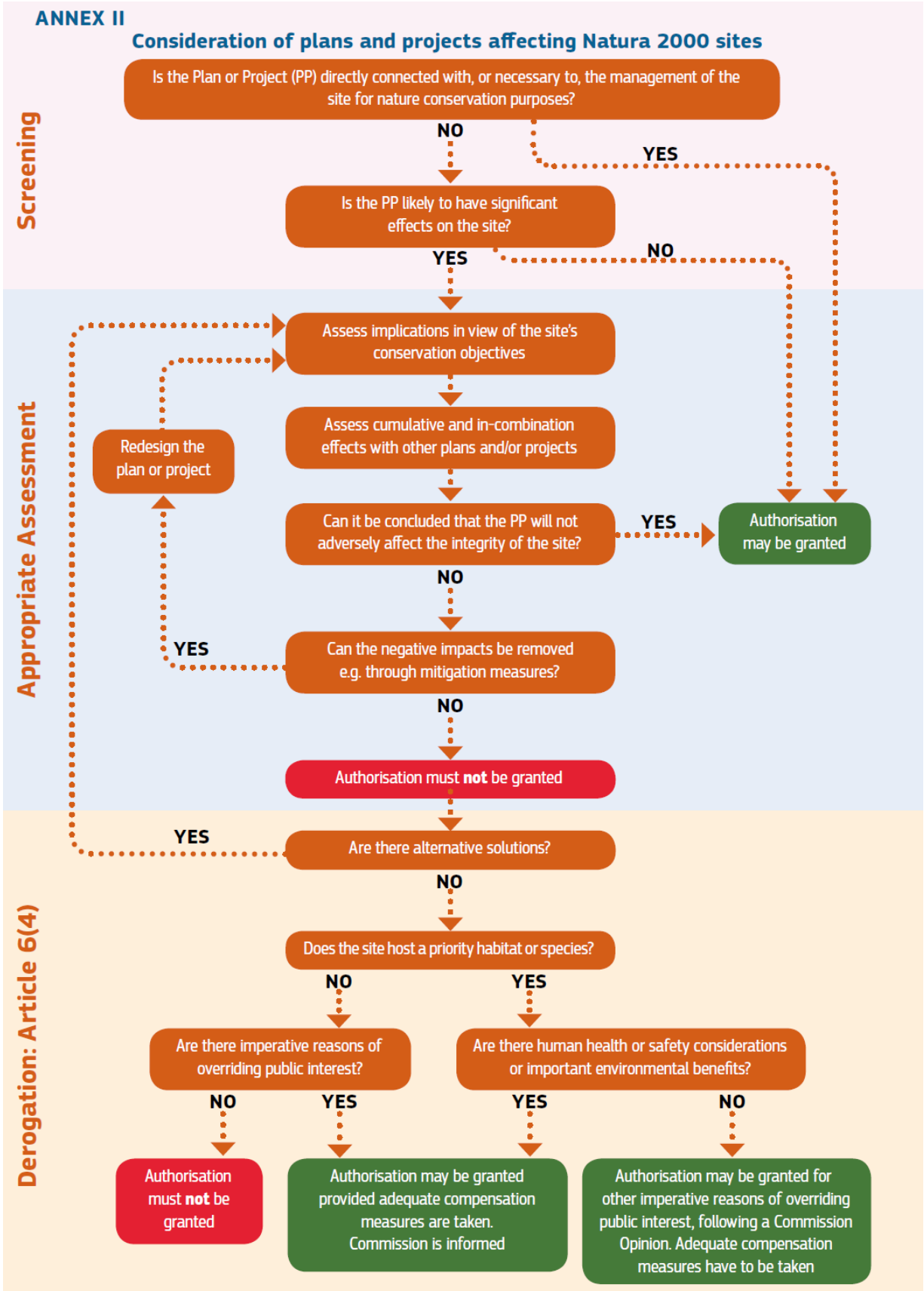


Figure 1.2 – Consideration of a plan or project affecting a Natura 2000 site



Source: European Commission (2019)

2 PROJECT DESCRIPTION

2.1 Survey background and purpose

As noted in Section 1, Kinsale Energy is preparing for the decommissioning of the Kinsale Area gas fields and facilities, including the Kinsale Alpha (KA) and Kinsale Bravo (KB) platforms. Two applications have been made in relation to the decommissioning of the Kinsale area facilities which were each accompanied by an Environmental Impact Assessment Report and Appropriate Assessment screening[2]. These applications covered; facilities preparation, well plug and abandonment, platform topsides and subsea structure removal (application no. 1); and jacket removal (application no. 2).

As noted in the decommissioning programme for application no. 2 (see Section 3 of the related EIAR), it is proposed that the jacket piles are cut prior to jacket removal through the use of an internal cutting tool, or where required, cutting externally. Some excavation of surficial seabed sediments may therefore be required to access the piles to allow external cutting as part of jacket removal.

The surficial sediments across the Kinsale Head area are shallow, with sub-cropping chalk present near the surface. It is proposed that a survey is undertaken in order to determine the present depth of the surficial sediments at each platform to inform the level of any excavation required. For the purposes of jacket lift, it is only required to determine whether the chalk/seabed sediment contact is within 5m of the seabed.

This AA Screening Report has been prepared to cover the survey elements only. The jacket removal procedures have already been detailed and assessed as part of the application no. 2 and are not considered again here.

2.2 Survey activity and equipment

The specific equipment to be used as part of the survey is yet to be selected, but the range of equipment which could be deployed is listed in Table 2.1, and all are considered in terms of their potential impact in Section 4. The potential equipment includes several different types of sub-bottom profilers (SBPs) which can provide information on the shallow geology to depths of between a few metres to up to 100m below the seabed depending on the specific device and sediment characteristics. The selected equipment will not differ substantially from those listed in Table 2.1 such that the scale or nature of potential effects will not differ from those assessed in this report.

A line plan for the survey is shown in Figure 2.1, applicable to both platforms. Around each platform, four lines, each of approximately 120-160m length, will be surveyed at 30m off each platform face. Equipment may be hull-mounted or towed; in the case of the latter, the equipment will first be deployed over-board prior to the sailing of the survey lines. Data collection quality will be monitored and additional lines may need to be run; if required, these will be in the same area as indicated in Figure 2.1.

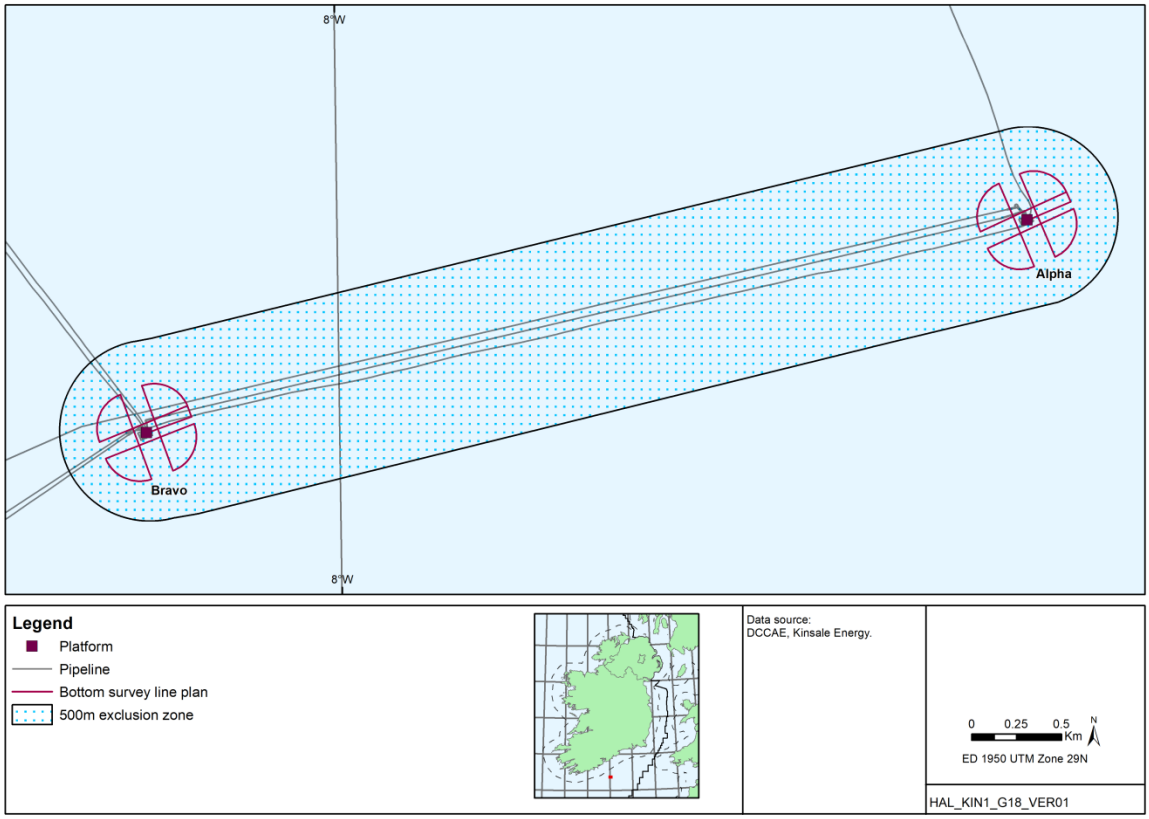
[2] See: https://www.dccae.gov.ie/en-ie/natural-resources/topics/Oil-Gas-Exploration-Production/environment/statutory-consents/ministerial-decisions/decommissioning-kinsale-head-and-seven-heads-facilities/Pages/Decommissioning%20Kinsale%20Head%20and%20Seven%20Heads%20Facilities.aspx and https://www.dccae.gov.ie/en-ie/natural-resources/consultations/Pages/Decommissioning-of-certain-facilities-within-the-Kinsale-Head-Petroleum-Lease-area.aspx

It is planned that the survey will take place within the period of April to September 2020, and is expected to be complete in less than one day; operations will not take place in hours of darkness.

Table 2.1: Summary of potential survey equipment

Potential equipment	Source type	Central operating Frequency
Knudsen Pinger SBP	Pinger SBP	3.5kHz/15Hz
Edgetech 3100	Chirp SBP	2-16kHz
Knudsen Chirp 3260	Chirp SBP	3.5kHz
Innomar SES2000	Parametric/non-linear SBP	Primary: 100kHz Secondary: 2-22kHz (planned = 2kHz-10kHz)

Figure 2.1: Indicative survey lines for KA and KB



2.3 Vessel

The vessel to complete the survey programme has not yet been selected. For the purposes of this assessment, a representative vessel has been assumed (e.g. RV Celtic Explorer, RV Ocean Researcher or equivalent).

3 IDENTIFICATION OF RELEVANT NATURA 2000 SITES

3.1 Overview

Relevant Natura 2000 sites were considered for inclusion/exclusion in the screening process with respect to whether an impact pathway could be identified between the features for which they are designated and the proposed survey activities described in Section 2. The identification of potential impacts from the survey and relevant sites is based on:

- the nature and scale of the proposed survey,
- the sources of potential effect from the survey activities and their likely spatial footprint,
- identification of those qualifying interests of Natura 2000 sites which are sensitive to the sources of potential effect,
- the relative location of relevant Natura 2000 sites and their qualifying interests (including where mobile species may be located beyond site boundaries, e.g. when foraging), to the spatial footprint of effect.

3.2 Site selection process

Guidance from the National Parks and Wildlife Service - *Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities* (DoEHLG, 2010) recommends that the identification of any Natura 2000 site which might be affected by any plan or project should be evaluated on a case-by-case basis but that that the appropriate assessment process should include the following Natura 2000 sites:

1. Any Natura 2000 sites within or adjacent to the plan or project area.
2. Any Natura 2000 sites within the likely zone of impact of the plan or project. A distance of 15km is currently recommended in the case of plans, and derives from UK guidance (Scott Wilson *et al.* 2006). For projects, the distance could be much less than 15km, and in some cases less than 100m, but this must be evaluated on a case-by-case basis with reference to the nature, size and location of the project, and the sensitivities of the ecological receptors, and the potential for in-combination effects.
3. Natura 2000 sites that are more than 15km from the plan or project area, depending on the likely impacts of the plan or project, and the sensitivities of the ecological receptors, bearing in mind the precautionary principle. In the case of sites with water dependent habitats or species, and a plan or project that could affect water quality or quantity, for example, it may be necessary to consider the full extent of the upstream and/or downstream catchment.

This AA screening has identified Natura 2000 sites which could be affected by the survey based on the nature and scale of the proposed survey programme (Section 2), its sources of potentially significant effect (Section 3.3), an understanding of the nature and scale of such effects (Section 3.4), and the potential for interaction between relevant qualifying interests and these effects (Section 3.5). The sites identified for screening are assessed for the likelihood for significant negative direct, indirect and in-combination effects in Section 4.

3.3 Sources of potential effect

In respect of the proposed survey, the main sources of potential effect relevant to Natura 2000 sites and their qualifying interests arise from:

- physical presence of the survey vessel,
- underwater noise including from the vessel and survey equipment.

The survey programme does not involve any physical interaction with the seabed, and therefore the potential for physical disturbance effects has been discounted. It is therefore not considered that the survey programme could result in a foreseeable interaction with any Annex I habitat, and therefore such qualifying interests of related sites have not been screened in for further consideration.

The evidence base for the sources of potential effect are considered in turn below against major groups of receptors for which there is considered to be a potential interaction, which are primarily marine mammals, birds and fish. The evidence is then considered against the potential presence of qualifying interests to allow identification of the relevant Natura 2000 sites.

3.4 Evidence base for the nature and scale of potential effects

3.4.1 Physical presence of the survey vessel

Birds

The Kinsale Area may support important numbers of birds at certain times of the year including overwintering birds and those foraging from coastal SPAs. Therefore, the presence and/or movement of the survey vessel could temporarily disturb birds from relevant SPA sites.

Physical disturbance of seaduck and other waterbird flocks by vessels is possible, particularly in SPAs established for shy species (e.g. common scoter). Such disturbance can result in repeated disruption of bird feeding, loafing and roosting. For example, large flocks of common scoter were observed being put to flight at a distance of 2km from a 35m vessel, though smaller flocks were less sensitive and put to flight at a distance of 1km (Kaiser 2002, also see Schwemmer *et al.* 2011). Larger vessels would be expected to have an even greater disturbance distance (Kaiser *et al.* 2006). Mendel *et al.* (2019) further note behavioural response in red-throated diver within 5km of ships. Divers and sea ducks have been assessed as being the most sensitive species groups to offshore development and associated boat traffic. Whilst displacement effects for divers have been detected at greater distances (e.g. 5-7km, Webb 2016; significant changes noted at 10-16.5km, Mendel *et al.* 2019), this relates to the construction and operation of offshore wind farms which have a much larger spatial and temporal footprint than oil and gas survey activities. Fleissbach *et al.* (2019) reported maximum escape distances for individual birds in response to vessels to be 3.2km for common scoter, with other sea ducks, divers, red-breasted merganser and cormorant all ≥1.5km; consequently, these are the species considered to be sensitive to vessel disturbance for the purposes of this assessment. It is noted that flock escape distances for all the aforementioned species were 1.2km or less. Considering the evidence, for divers, sea ducks and other species identified as most sensitive to vessel disturbance, a 4km displacement buffer is considered to be appropriate. Similarly, such species generally forage in coastal waters of ≤20m depth (Fox *et al*. 2003), which limit their potential to interaction with offshore activities in deeper waters.

Certain seabird species (e.g. gulls, fulmar, kittiwake) are generally considered to be less sensitive to shipping activities (Garthe & Hüppop 2004, Fleissbach *et al.* 2019), with others such as guillemot and razorbill regarded to have moderate sensitivity (Fleissbach *et al.* 2019, also see MMO 2018).

Criterion used: Screen in any SPA for species sensitive to vessel disturbance which is located within 4km of the survey area, or where activities take place within shallow coastal waters known to be used by such species. For seabirds, screen in any colony SPA for which a qualifying interest could theoretically be present in the survey area based on available foraging range data.

Marine mammals

The primary source of potential physical effect from vessels in relation to marine mammals is collision. Worldwide, collisions with vessels are a potential source of mortality to marine mammals, primarily cetaceans. Whales are occasionally reported to be struck and killed by ships, especially by fast-moving ferries, but smaller cetacean species and seals can also be impacted by propeller strikes from smaller vessels. In the UK certain areas experience very high densities of commercial and recreational shipping traffic, some of which may also be frequented by large numbers of marine mammals; despite this, relatively few deaths are recorded as results of collisions (Hammond *et al*. 2008). Between 2000 and 2009, only 11 out of 1,100 post-mortems on harbour porpoises and common dolphins identified collision as the cause of death (UKMMAS 2010).

Criterion used: Screen in any SAC for marine mammal species where the site boundary overlaps the survey area, and for pinnipeds screen in any site within foraging range. Cetaceans are not central-place foragers, and attributing any animals to a specific SAC is challenging. For the purposes of this assessment, cetaceans which are qualifying interests of all SACs within the relevant management units as defined by IAMMWG (2015) have been used.

3.4.2 Underwater noise including from the vessel and survey equipment

Studies on the potential effects of underwater noise from marine survey have tended to focus on seismic survey using airgun arrays. While the proposed survey will generate significantly less noise than airgun sources, these studies have relevance to the consideration of potential noise effects on birds, fish and marine mammals and are therefore summarised here.

Birds

Information on the underwater hearing abilities of diving birds and evidence of the effects of underwater anthropogenic noise is very limited. Direct effects from underwater acoustic surveys on diving birds could potentially occur through physical damage, given exposure to sufficiently high amplitudes, or through behavioural disturbance. Deeper-diving species which spend longer periods of time underwater (e.g. auks) may be most at risk of exposure, but all species which routinely submerge in pursuit of prey and benthic feeding opportunities in marine and estuarine habitats may be exposed to anthropogenic noise. A list of relevant species is provided in Table 3.1.

Tests of hearing in a range of diving species suggest a hearing range of approximately 500Hz to 4kHz, with similar results obtained in air and underwater (Crowell 2014, Crowell e*t*

al. 2015, Hansen *et al*. 2017). McCauley (1994) inferred from vocalisation ranges that the threshold of perception for low frequency seismic noise in some species (e.g. penguins, considered as a possible proxy for auk species) would be high, hence individuals might be adversely affected only in close proximity to the source.

Very high amplitude low frequency underwater noise may result in acute trauma to diving seabirds, with several studies reporting mortality of diving birds in close proximity (i.e. tens of metres) to underwater explosions (Yelverton *et al*. 1973, Cooper 1982, Stemp 1985, Danil & St Leger 2011). However, mortality of seabirds has not been reported during extensive seismic operations in the North Sea and elsewhere.

With the exception of Pichegru *et al*. (2017), which relates to penguins, there are no published reports of changes in abundance or distribution of diving birds concurrent with seismic or other acoustic survey activity. A study investigated seabird abundance in Hudson Strait (Atlantic seaboard of Canada) during seismic surveys over three years (Stemp 1985). Comparing periods of shooting and non-shooting, no significant difference was observed in abundance of thick-billed murre (Brünnich's guillemot), or fulmar or kittiwake.

While seabird responses to approaching vessels are highly variable (e.g. Fleissbach *et al*. 2019), flushing disturbance would be expected to displace most diving seabirds from close proximity to the survey vessel and any towed equipment, thereby limiting their exposure to the highest sound pressures generated. Similarly, any behavioural disturbance of seabirds due to the survey activities is most likely to be temporary displacement associated with the physical presence of the vessel, comparable to that experienced by routine shipping traffic.

Table 3.1: Migratory and/or Annex I diving bird species considered potentially vulnerable to underwater noise effects

Divers and grebes	**Diving ducks**
Great northern diver *Gavia immer*	Pochard *Aythya ferina*
Red-throated diver *Gavia stellata*	Tufted duck *Aythya fuligula*
Black-throated diver *Gavia arctica*	Scaup *Aythya marila*
Little grebe *Tachybaptus ruficollis*	Eider *Somateria mollissima*
Great crested grebe *Podiceps cristatus*	Long-tailed duck *Clangula hyemalis*
Slavonian grebe *Podiceps auritus*	Common scoter *Melanitta nigra*
	Velvet scoter *Melanitta fusca*
Seabirds	Goldeneye *Bucephala clangula*
Manx shearwater *Puffinus puffinus*	Red-breasted merganser *Mergus serrator*
Gannet *Morus bassanus*	Goosander *Mergus merganser*
Cormorant *Phalacrocorax carbo carbo*	
Shag *Phalacrocorax aristotelis*	
Guillemot *Uria aalge*	
Razorbill *Alca torda*	
Puffin *Fratercula arctica*	

Note: Includes species which are known to engage in pursuit diving or benthic feeding in marine, coastal and estuarine waters at least during part of the year.

Marine mammals

Information on the potential effects of other geophysical surveys (e.g. sub-bottom profilers) is limited, with empirical studies of animal responses to such surveys lacking. The most recent UK Offshore Energy SEA (DECC 2016) concluded that, given the characteristics of the noise sources produced, effects are considered to be negligible but with a high level of uncertainty.

Recent investigation of the source levels of a variety of high-resolution geophysical survey (HRGS) sources (Crocker & Fratantonio 2016, Crocker *et al*. 2019), combined with preliminary results of emitted sound fields, have provided evidence to support the conclusion of very low risk of significant effects from non-airgun HRGS sources, with received levels dropping to below that which might be expected to cause behavioural disturbance within a few hundred metres of the source (Halvorsen & Heaney 2018).

Evidence of the effects of seismic surveys on odontocetes and pinnipeds is limited but of note are studies in the Moray Firth observing responses to a 10 day 2D seismic survey (Thompson *et al.* 2013). The 2D seismic survey took place in September 2011 and exposed a 200km^2 area to noise throughout that period; peak-to-peak source levels generated by the 470 cubic inch airgun array were estimated to be 242-253 dB re 1 µPa at 1m and are therefore representative of the volume of a typical array used in VSP, and larger than that used in rig-site survey. Within 5-10km from the source, received peak-to-peak SPLs were estimated to be between 165 and 172 dB re 1 µPa, with SELs for a single pulse between 145 and 151 dB re 1 µPa^{2}s. A relative decrease in the density of harbour porpoises within 10km of the survey vessel and a relative increase in numbers at distances greater than 10km was reported; however, these effects were short-lived, with porpoise returning to affected areas within 19 hours after cessation of activities.

More recently, the effects of a large 3D seismic survey conducted in the Danish sector of the North Sea on harbour porpoise echolocation activity were examined (Sarnocińska *et al*. 2020). The source comprised a 3,570in^3 airgun array and the survey lasted 103 days, with seismic activity occurring on all but 17 days, covering an area of 1,121km^2. Acoustic loggers were deployed inside and adjacent to the seismic survey area, before, during and after the survey over a total duration of 9 months. Three different measures of porpoise activity showed a dose-response effect, with the lowest activity closest to the source vessel, and activity increasing up to a range of 8-12km, beyond which baseline acoustic activity was attained and no general displacement could be detected compared to reference stations at 15km from the seismic activity. The lowest porpoise acoustic activity was recorded at SELs for a single pulse of 155dB re 1 µPa^{2}s - a similar level to that estimated by Thompson *et al*. (2013) at distances where harbour porpoise detections were reduced.

Overall, it was concluded that while short-term disturbance was induced, the survey did not lead to long-term or broad-scale displacement (Thompson *et al*. 2013). Further acoustic analyses revealed that for those animals which stayed in proximity to the survey, there was a 15% reduction in buzzing activity associated with foraging or social activity; however, a high level of natural variability in the detection of buzzes was noted prior to survey (Pirotta *et al*. 2014). Passive acoustic monitoring provided evidence of short-term behavioural responses also for bottlenose dolphins, but no measurable effect on the number of dolphins using the Moray Forth SAC could be revealed (Thompson *et al*. 2013b).

Noise from the presence and movement of vessels could also potentially disturb marine mammals foraging within or close to sites for which they are a qualifying feature. Reported responses include avoidance, interrupted foraging behaviour, changes in swimming speed, direction and surfacing patterns, and alteration of the intensity and frequency of calls (review in Erbe *et al*. 2019). Chronic exposure has also been linked to an increase in stress-related hormones (Rolland *et al.* 2012). Harbour porpoises, white-sided dolphins and minke whales have been shown to respond to survey vessels by moving away from them, while white-beaked dolphins have shown attraction (Palka & Hammond 2001). A study on captive harbour porpoises in a semi-natural net-pen complex in a Danish canal, recorded their behaviour while simultaneously measuring underwater noise of vessels passing the enclosure; reaction to noise was defined to occur when a highly stereotyped 'porpoising' behaviour was observed. Porpoising occurred in response to almost 30% of vessel

passages; the most likely behavioural trigger were medium- to high- frequency components (0.25–63kHz octave bands) of vessel noise, while low- frequency components of vessel noise and additional pulses from echo-sounders could not explain the results (Dyndo *et al*. 2015). A tagging study of a small number of free-ranging porpoises in Danish coastal waters estimated that porpoises encountered vessel noise 17-89% of the time (from evaluation of the wideband sound and movement tag recordings). Occasional high-noise levels (coinciding with a fast ferry) were associated with vigorous fluking, bottom diving, interrupted foraging and even cessation of echolocation, leading to significantly fewer prey capture attempts at received levels greater than 96dB re 1 mPa (16 kHz third-octave, Wisniewska *et al.* 2018).

More evidence is available on bottlenose dolphins, especially for coastal populations. Shore-based monitoring of the effects of boat activity on the behaviour of bottlenose dolphins off the US South Carolina coast, indicated that slow moving, large vessels, like ships or ferries, appeared to cause little to no obvious response in bottlenose dolphin groups (Mattson *et al*. 2005). Pirotta *et al*. (2015) used passive acoustic techniques to quantify how boat disturbance affected bottlenose dolphin foraging activity in the inner Moray Firth. The presence of moving motorised boats appeared to affect bottlenose dolphin buzzing activity (foraging vocalisations), with boat passages corresponding to a reduction by almost half in the probability of recording a buzz. The boat effect was limited to the time where a boat was physically present in the sampled area and visual observations indicated that the effect increased for increasing numbers of boats in the area (Pirotta *et al.* 2013). Dolphins appeared to temporarily interrupt their activity when disturbed, staying in the area and quickly resuming foraging as the boat moved away.

Fish

Studies of fish mortality or behavioural response to noise have tended to focus on geological seismic survey using airgun arrays, and while the proposed survey will generate significantly less noise than these, these studies have relevance to the consideration of potential noise effects on fish and are therefore summarised here.

Studies investigating fish mortality and organ damage from noise generated during seismic surveys are limited and results are highly variable, from no effect to long-term auditory damage (reviewed in Carroll *et al*. 2017). Behavioural responses and effects on fishing success (“catchability”) have been reported following seismic surveys (Pearson *et al.* 1992, Skalski *et al.* 1992, Engås *et al.* 1996, Wardle *et al*. 2001), although a similar number of studies have reported no effects on catches or abundance, or conflicting results (Carroll *et al*. 2017). Existing studies do not yield completely coherent results but show that short-term startle responses are common at high exposure levels, and that fish can stop foraging and move down in the water column (Slabbekoorn *et al*. 2019). Such temporary displacement and/or altered feeding behaviour are likely to be responsible for the reduced catches reported in some circumstances.

Potential effects on migratory diadromous fish is an area of significant interest for which empirical evidence is still limited, especially as salmonids and eels are sensitive to particle motion (not sound pressure) (Gill & Bartlett 2010). Atlantic salmon *Salmo salar* have been shown through physiological studies to respond to low frequency sounds (below 380Hz), with best hearing at 160Hz (threshold 95 dB re 1 µPa). Harding *et al.* (2016) note a lower sensitivity at 100Hz than previously reported (Hawkins & Johnstone 1978), and greater sensitivity at frequencies of >200Hz, with evidence of some response at 400-800Hz. However, the authors qualify their results with differences in methodological approach, and the use of fish maintained in tanks receiving low frequency ambient sound within the greatest range of sensitivity (<300Hz) for some time in advance of the experiments taking

place. The ability of salmon to respond to sound pressure is regarded as relatively poor with a narrow frequency span, a limited ability to discriminate between sounds, and a low overall sensitivity relative to other fish species (Hawkins & Johnstone 1978, cited by Gill & Bartlett 2010, Harding *et al.* 2016). A recent study of the hearing ability of sea lamprey (*Petromyzon marinus*) reported that, consistent with fish lacking a swim bladder, sea lamprey showed a limited sensitivity to sound, with juveniles detecting tones of 50-300Hz, but not higher frequencies (Mickle *et al*. 2019).

Criterion used: Screen in any SAC and SPA with qualifying interests which are noise sensitive (marine mammals, migratory fish, diving birds) either where the site boundary is within 15km of the survey area or where foraging ranges may bring such qualifying interests to within this distance. For cetaceans, screen in any SAC within the relevant management unit (after IAMMWG 2015) where the survey is proposed to take place.

3.5 Relevant sites

Natura 2000 sites (Special Areas of Conservation, SACs and Special Protection Areas, SPAs) have been identified on the basis that they could have a potential interaction with the survey activities, using the criteria outlined in Section 3.4. These are presented in Figures 3.1 and 3.2.

No Natura 2000 sites are located within the survey area, nor are any within those distances noted in the criteria set out in Section 3.4 where effects are considered possible. The identification of sites has therefore concentrated on the potential for relevant mobile species (seabirds, marine mammals and fish) which are qualifying interests of Natura 2000 sites, to interact with the survey area and its wider footprint of effect.

An overview of the current understanding of the foraging ranges of relevant species is given below. While these may indicate a theoretical interaction between a site feature and the survey area, there is an important distinction to be made between a potential interaction with site features and the potential for likely significant effects (i.e. those which could undermine a site's conservation objectives), which are considered further in Section 4.

3.5.1 SACs

Marine mammals

Relevant SACs in Ireland for which an interaction is considered possible include those for harbour porpoise, grey seal and harbour seal.

The harbour porpoise is the most abundant and widespread species occurring around the Irish coast, commonly seen in shallow coastal waters in the summer, although surveys suggest highest densities along the south coast occur in autumn (Marine Institute 2013). They move further offshore in the spring; although the details of this migration are uncertain, it may be linked to calving (DCENR, 2015). Harbour porpoise are generally less often encountered in the Celtic Sea than in the Irish Sea, although it may be that this is a result of lower survey effort and higher sea states off the south coast (Wall *et al*. 2013). In both the Celtic Sea Herring Assessment Survey (CSHAS) and selected Irish Whale and Dolphin Group (IWDG) casual sightings data, harbour porpoise are the second most frequently sighted toothed cetacean, seen both close to shore and in offshore waters. A comparison of the results of the broad-scale SCANS and SCANS-II surveys (SCANS-II 2008) indicate there has been a general shift to the southwest and an increase in the harbour porpoise population in the region over the period between the surveys. Two strata surveyed for

marine mammals as part of the ObSERVE programme are relevant to the survey location, which took place across summer and winter 2015 and 2016. These are Stratum 4 and Stratum 8, which was only surveyed in summer and winter 2016, and covered 9,506km^2 of coastal waters off the south and south-west coasts. For the area relevant to the proposed survey, predicted distribution maps from the ObSERVE programme suggest the presence of higher densities of harbour porpoise in summer than in winter (relative to other surveyed areas for each species).

SACs for harbour porpoise represent areas supporting persistently higher densities of animals relative to elsewhere in their range (e.g. Heinänen & Skov 2015). Harbour porpoise are a highly mobile, wide-ranging species; while some individuals using designated SACs will exhibit a degree of site fidelity, they are not central place foragers like seals or breeding seabirds and will travel and forage over a large area. While harbour porpoise using more distant SACs are less likely to occur in the Kinsale Area, their broad-scale movements are poorly understood, and so a precautionary approach has been taken to screen in any SACs occurring within the same management unit as the Kinsale Area. The Kinsale Area lies within the large Celtic and Irish Seas harbour porpoise management unit, which encompasses the majority of coastal waters of Ireland, in addition to those of Wales, south-west and north-west England and south-west Scotland (IAMMWG 2015).

While bottlenose dolphins are also known to occur in the wider Kinsale Area (e.g. Rogan *et al*. 2018), there are no SACs where this species is a qualifying feature within the relevant management unit of Offshore Channel, Celtic Sea & South West England.

Grey seals occupy haul-outs along the Irish coast, to which they return to rest, breed and rear young. Breeding in Ireland generally takes place between September and December (Cronin *et al*. 2011). Grey seals favour exposed rocky shores, sand-bars or sea caves, with easy access to deep water for breeding and the largest colonies are found on exposed islands off the west and southwest coasts. The closest major colony to the Kinsale Area is at Roaringwater Bay, 97km away. They are a designated feature of the Roaringwater Bay and Islands SAC, where a permanent population of up to 150 individuals is estimated (NWPS website). The total grey seal population of Ireland has been estimated at between 5,500 and 7,000 individuals (Ó Cadhla *et al*. 2008) and Duck & Morris (2013) estimated that 9% were present along the Co. Cork coast. Grey seal densities at sea are highest in coastal waters, particularly close to colonies and haul-outs, but individuals may undertake foraging excursions up to 100km offshore (Jones *et al*. 2015). Distances travelled by seals tagged on Great Blasket Island in Co. Kerry by Cronin *et al*. (2011) were variable. It was found that larger seals spent longer foraging at sea but travelled shorter distances, while smaller seals were found to travel as far as the Western Isles of Scotland, utilising haul-out sites along the way. The seals were found to spend more time at sea during the summer.

Marine usage maps for the UK and Ireland based on extensive tagging data suggest a very low occurrence of grey seals in the Kinsale Area, with animals present in waters around the south coast of Ireland focused off southwest Cork and southeast Wexford (Jones *et al*. 2015). Grey seals were observed in five of the 11 annual CSHAS from 2008-2018, comprising 14 sightings of single seals, most of which were close to the coast (e.g. O'Donnell *et al.* 2018).

Harbour seals are generally found in more sheltered areas, again predominantly along the west coast. Females pup in June or July, and the annual moult takes place in July and August, so harbour seals tend to be at or near haul-outs through the summer (Cronin *et al*. 2008, Rakka & Minto 2015).

Harbour seals rarely forage far from their haul-out, with surveys in southwest Ireland suggesting they generally stay within 20km of their haul-out (Cronin *et al*. 2008), although longer distances do occur (e.g. Jones *et al.* 2015 noted that only 3% of tagged harbour seals foraged further than 50km) and foraging behaviour seems to vary with geographical location. The Irish population of harbour seal was estimated at 3,000-4,150 individuals (DCENR 2015) and Duck & Morris (2013) estimated 13% of the total population were present along the County Cork coast.

Marine usage maps for the UK and Ireland based on extensive tagging data suggest a very low occurrence of harbour seals in the Kinsale Area, with animals present in waters around the south coast of Ireland focused off southwest Cork and Kerry (Jones *et al*. 2015). No confirmed harbour seal sightings occurred off the south coast of Ireland in any of the 11 annual CSHAS.

The above evidence of at-sea distribution of seals suggests that the Kinsale Area is not within the normal foraging range of either species; however, taking a precautionary approach, and considering that data are subject to uncertainty, sites for grey and harbour seal were screened in for further consideration on the basis of whether they are within 100km and 50km of the survey respectively.

Fish

Of those fish listed under Annex II of the EC Habitats Directive, those relevant to potential sources of effect identified for the survey are Atlantic salmon, sea lamprey, river lamprey and twaite shad, as these are migratory and spend part of their life cycle at sea. These are likely to have a widespread and transient presence offshore, and therefore any sites located along the Cork, Waterford and Wexford coasts where the aforementioned species are a qualifying interest have been screened in for further assessment. Sites with the freshwater pearl mussel listed as a qualifying interest were also included, as Atlantic salmon forms a critical part of their lifecycle.

Table 3.2: SACs identified for further consideration

Site code	Site name	Relevant qualifying interests
IE0000101	Roaringwater Bay and Islands SAC	Harbour porpoise
		Grey seal
IE0002172	Blasket Islands SAC	Harbour porpoise
IE0003000	Rockabill to Dalkey Island SAC	Harbour porpoise
IE0002171	Bandon River SAC	Freshwater pearl mussel
IE0002170	Blackwater River (Cork/Waterford) SAC	Freshwater pearl mussel
		Atlantic salmon
		Sea lamprey
		River lamprey
		Twaite shad
IE0002162	River Barrow and River Nore SAC	Freshwater pearl mussel
		Atlantic salmon
		Sea lamprey
		River lamprey
		Twaite shad
IE0002137	Lower River Suir SAC	Freshwater pearl mussel

Site code	Site name	Relevant qualifying interests
		Atlantic salmon
		Sea lamprey
		River lamprey
		Twaite shad
IE0000781	Slaney River Valley SAC	Freshwater pearl mussel
		Atlantic salmon
		Sea lamprey
		River lamprey
		Twaite shad
UK0030396	Bristol Channel Approaches / Dynesfeydd Môr Hafren	Harbour porpoise
UK0030398	North Anglesey Marine / Gogledd Môn Forol	Harbour porpoise
UK0030397	West Wales Marine / Gorllewin Cymru Forol	Harbour porpoise
UK0030399	North Channel	Harbour porpoise

3.5.2 SPAs

Waterbirds

Physical disturbance of seaduck and other waterbird flocks by vessel traffic is possible, but the distance from the survey vessel at which flushing of birds could take place (~4km) is significantly less than the minimum distance from the proposed survey (at least 49km, Sovereign Islands SPA). The coastal nature of the foraging activities of waterbirds further limits the potential for any interaction between such qualifying interests and the survey, such that no sites were identified on this basis.

Seabirds

Information on the foraging movements of a number of seabird species has increased in recent years, mainly due to advances in satellite and other tracking technologies (e.g. Langston *et al*. 2013, Wakefield *et al*. 2015, 2017, Thaxter *et al*. 2014, 2018, Cleasby *et al*. 2015, 2020, Bogdanova *et al*. 2017, Carter *et al*. 2016, Edwards *et al*. 2016, Votier *et al*. 2017). There is generally limited information on foraging areas used by species from particular colonies and to help address this, Thaxter *et al*. (2012) reported on representative breeding season foraging ranges for a range of species.

Table 3.3 provides indicative foraging ranges (mean and mean maximum) travelled for a range of seabird species from a breeding colony to a foraging area, which have been used to identify relevant sites on the basis that related qualifying interests could interact with the survey area. The mean maximum foraging range value has been used here to show possible connectivity to breeding colony SPAs, but bird density will not be continuous throughout this range. Other ways of representing foraging ranges (e.g. the mean, or percentage foraging area derived from kernel analyses) may therefore provide more useful information, where available. Whilst applying mean maximum foraging radius would encompass the majority of a population's home-range area, the overall size of the predicted foraging areas around the colony would potentially make it too large to be a useful management tool, without further refinement using habitat and bathymetric data (Soanes *et al.* 2016). Similarly, the assumption that seabirds are uniformly distributed out to some threshold distance from their colonies, such as their putative maximum foraging range, is unrealistic. Seabird density declines with distance from the colony with density-dependent competition, coastal morphology and habitat preferences (Wakefield *et al*. 2017), for

example oceanographic features at which seabirds preferentially forage including shelf-edge fronts, upwelling and tidal-mixing fronts, offshore banks and internal waves, regions of stratification, and topographically complex coastal areas subject to strong tidal flow (Cox *et al.* 2018), resulting in highly non-uniform distributions. While Critchley *et al*. (2018) used a distance-weighted foraging radius approach to project distributions at sea for a wide range of seabird species during the breeding season, the authors recognised the limitations of not considering environmental variables that contribute to such non-uniform distributions noted above.

The selection of all sites within the mean maximum foraging range of the survey area is a useful but simplistic approach to identifying relevant sites. The approach taken here has to be to review the initial selection of sites on this basis, and exclude those for which an interaction would be unrealistic, which primarily relates to sites for which fulmar has been identified as a qualifying interest in sites to the far north and west of Ireland. Fulmar are a highly pelagic seabird, and are highly unlikely to move large distances over land which could bring them to within the survey area. The potential mean maximum foraging range for this species has therefore been applied across the marine area, including where birds could move around headlands.

Table 3.3: Indicative breeding season foraging ranges

Species	Mean maximum[1] (km)	Mean[2] (km)	Confidence level[3]
Eider	80	2.4	Poor
Red-throated diver	9	4.5	Low
Fulmar	400 ± 245.8	47.5 ± 1	Moderate
Manx shearwater	18.3 ± 12.5 & >330	2.3 ±0.8	Moderate
Leach's storm petrel	91.7 ± 27.5	-	Poor
Gannet	229.4 ± 124.3	92.5 ± 59.9	Highest
Cormorant	25 ± 10	5.2 ± 1.5	Moderate
Shag	14.5 ± 3.5	5.9 ± 4.7	Moderate
Arctic skua	62.5 ± 17.2	6.4 ± 5.9	Uncertain
Great skua	10.9 ± 3.0 & 86.4	-	Moderate, Poor
Black-headed gull	25.5 ± 20.5	11.4 ± 6.7	Uncertain
Common gull	50	25	Poor
Mediterranean gull	20	11.5	Uncertain
Herring gull	61.1 ± 44	10.5	Moderate
Lesser black-backed gull	141.0 ± 50.8	71.9 ± 10.2	Moderate
Kittiwake	60.0 ± 23.3	24.8 ±12.1	Highest
Sandwich tern	49.0 ± 7.1	11.5 ± 4.7	Moderate
Roseate tern	16.6 ± 11.6	12.2 ± 12.1	Low
Common tern	15.2 ± 11.2	4.5 ± 3.2	Moderate
Arctic tern	24.2 ± 6.3	7.1 ± 2.2	Moderate
Little tern	6.3 ± 2.4	2.1	Low
Guillemot	84.2 ± 50.1	37.8 ± 32.2	Highest
Razorbill	48.5 ± 35.0	23.7 ± 7.5	Moderate
Puffin	105.4 ± 46.0	4	Low

Source: Thaxter et al. (2012)
Notes:

1. The maximum range reported in each study averaged across studies.
2. The mean foraging range reported for each colony averaged across all colonies. For tracking studies, this was typically the mean foraging range from all central place foraging trips assessed at the colony.
3. Confidence levels were assigned as follows: highest (based on >5 direct studies); moderate (between 2-5 direct studies); low (indirect measures or only one direct tracking study); uncertain (survey-based estimates); poor (few survey estimates or speculative data available).

Table 3.4: SPAs identified for further consideration

Site code	Site name	Relevant qualifying interests	Diving species potentially sensitive to underwater noise?
IE0004002	Saltee Islands SPA	Northern fulmar	N
		Lesser black-backed gull	N
		Manx shearwater	Y
		Northern gannet	Y
IE0004003	Puffin Island SPA	Northern fulmar	N
		Manx shearwater	Y
IE0004005	Cliffs of Moher SPA	Northern fulmar	N
IE0004007	Skelligs SPA	Northern fulmar	N
		Manx shearwater	Y
		Northern gannet	Y
IE0004008	Blasket Islands SPA	Northern fulmar	N
		Manx shearwater	Y
IE0004021	Old Head of Kinsale SPA	Northern fulmar	N
		Herring gull	N
		Black-legged kittiwake	N
		Common guillemot	Y
IE0004022	Ballycotton Bay SPA	Lesser black-backed gull	N
IE0004023	Ballymacoda Bay SPA	Lesser black-backed gull	N
IE0004028	Blackwater Estuary SPA	Lesser black-backed gull	N
IE0004030	Cork Harbour SPA	Lesser black-backed gull	N
IE0004032	Dungarvan Harbour SPA	Lesser black-backed gull	N
IE0004066	The Bull and The Cow Rocks SPA	Northern fulmar	N
		Northern gannet	Y
IE0004069	Lambay Island SPA	Northern fulmar	N
		Manx shearwater	Y
IE0004092	Tacumshin Lake SPA	Lesser black-backed gull	N
IE0004095	Kilcolman Bog SPA	Lesser black-backed gull	N
IE0004113	Howth Head Coast SPA	Northern fulmar	N
IE0004114	Illaunonearaun SPA	Northern fulmar	N
IE0004119	Loop Head SPA	Northern fulmar	N
IE0004117	Ireland's Eye SPA	Northern fulmar	N
IE0004122	Skerries Islands SPA	Northern fulmar	N
IE0004125	Magharee Islands SPA	Northern fulmar	N
IE0004127	Wicklow Head SPA	Northern fulmar	N
IE0004153	Dingle Peninsula SPA	Northern fulmar	N
IE0004154	Iveragh Peninsula SPA	Northern fulmar	N
IE0004155	Beara Peninsula SPA	Northern fulmar	N

Site code	Site name	Relevant qualifying interests	Diving species potentially sensitive to underwater noise?
IE0004156	Sheep's Head to Toe Head SPA	Northern fulmar	N
IE0004175	Deenish Island and Scariff Island SPA	Northern fulmar	N
		Manx shearwater	Y
IE0004189	Kerry Head SPA	Northern fulmar	N
IE0004190	Galley Head to Duneen Point SPA	Northern fulmar	N
IE0004191	Seven Heads SPA	Herring gull	N
IE0004192	Helvick Head to Ballyquin SPA	Northern fulmar	N
		Common guillemot	Y
UK9014051	Skomer, Skokholm and the Seas off Pembrokeshire / Sgomer, Sgogwm a Moroedd Penfro SPA	Lesser black-backed gull	N
		Manx shearwater	Y
UK9014041	Grassholm SPA	Northern gannet	Y

Figure 3.1: SPAs identified for further assessment

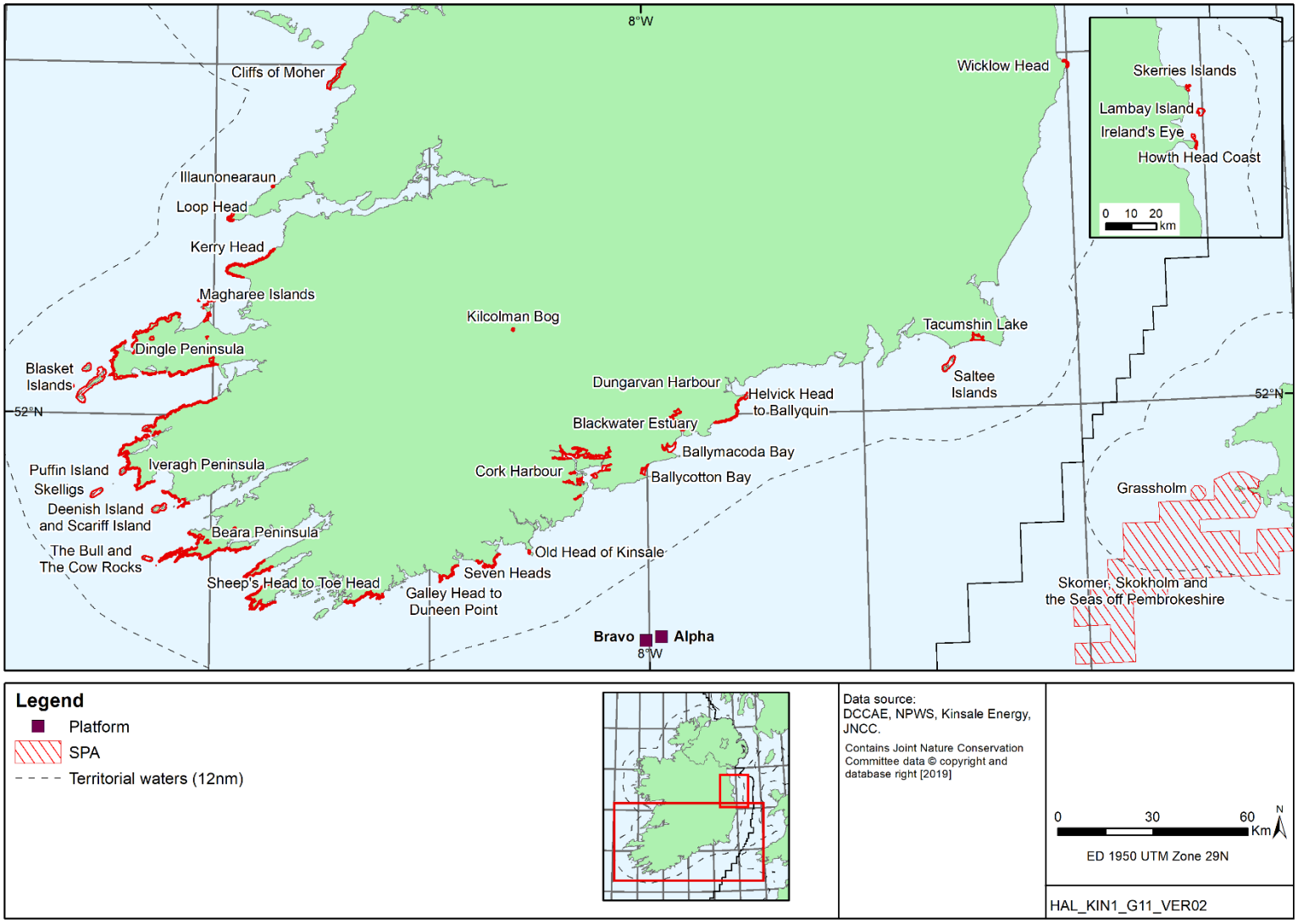
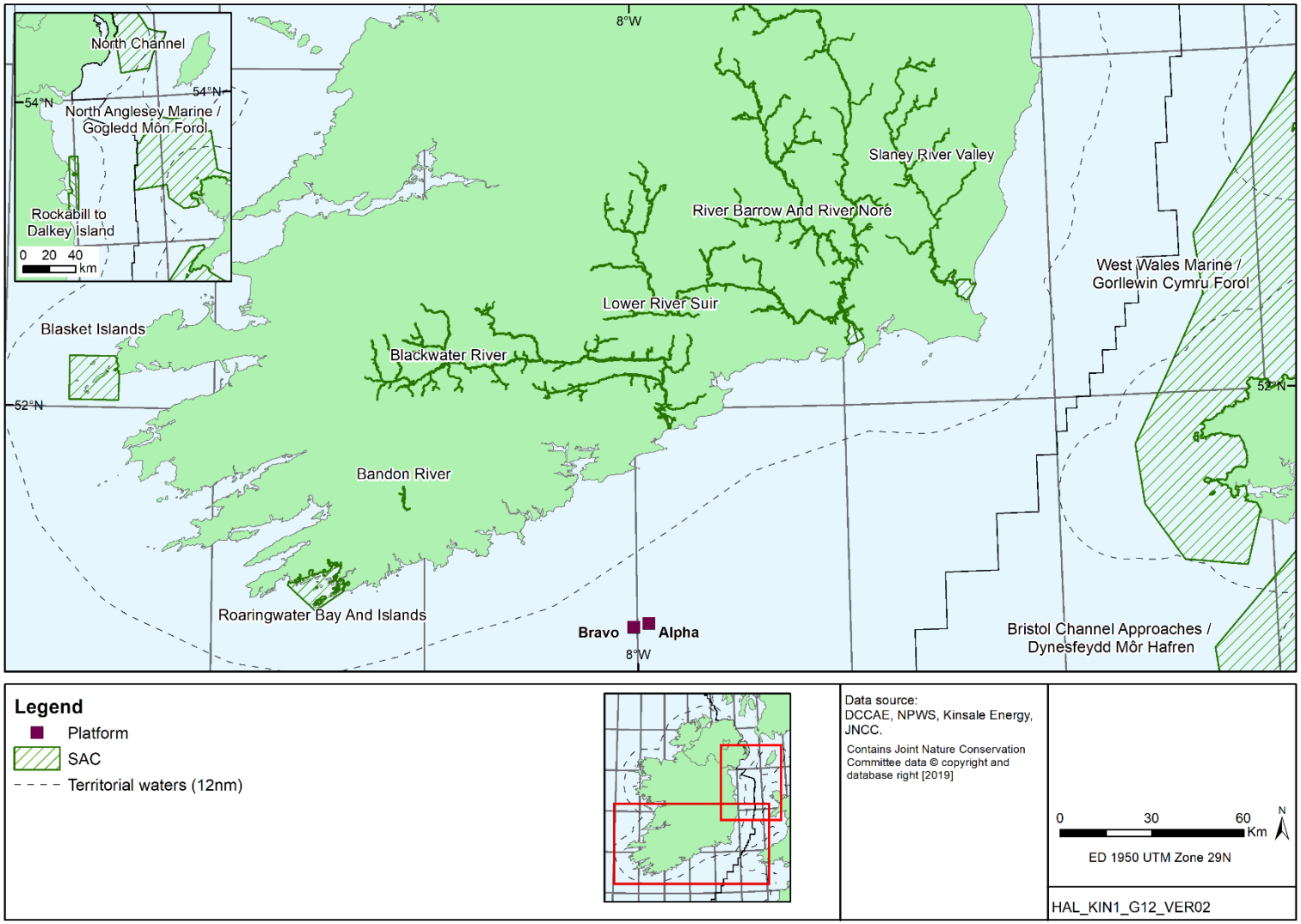


Figure 3.2: SACs identified for further assessment



4 SCREENING FOR LIKELY SIGNIFICANT EFFECTS

The sources of potentially significant effect from proposed survey activities considered relevant to the screening (i.e. where there is a recognised pathway for interaction with features subject to protection under the Birds and Habitats Directives) are the production of underwater noise and the physical presence/disturbance by vessels. Section 4.1 links the sources of potentially significant effect to individual sites and their relevant qualifying features. The potential for likely significant effects on the qualifying interests of the sites identified is considered in Section 4.2. Appendix 1 provides, for all sites listed in Table 4.1, tabulations of the site information (relevant qualifying interests, qualifying interests with a foreseeable interaction with the survey area, summary Conservation Objectives), the closest distance to the survey and a consideration of site interest features against potential sources of likely significant effect.

4.1 Consideration of potential sources of effect

Table 4.1 shows the individual sites and their relevant qualifying features linked to the sources of potentially significant effect from the proposed survey activities. Those sites identified are then considered in Section 4.2.

Table 4.1: Sites identified for further consideration

Site code	Site name	Relevant qualifying interests	Physical presence	Underwater noise
SACs				
IE0000101	Roaringwater Bay and Islands SAC	Harbour porpoise	✓	✓
		Grey seal	✓	✓
IE0002172	Blasket Islands SAC	Harbour porpoise	✓	✓
IE0003000	Rockabill to Dalkey Island SAC	Harbour porpoise	✓	✓
IE0002171	Bandon River SAC	Freshwater pearl mussel	✓	✓
IE0002170	Blackwater River (Cork/Waterford) SAC	Freshwater pearl mussel	✓	✓
		Atlantic salmon	✓	✓
		Sea lamprey	✓	✓
		River lamprey	✓	✓
		Twaite shad	✓	✓
IE0002162	River Barrow and River Nore SAC	Freshwater pearl mussel	✓	✓
		Atlantic salmon	✓	✓
		Sea lamprey	✓	✓
		River lamprey	✓	✓
		Twaite shad	✓	✓
IE0002137	Lower River Suir SAC	Freshwater pearl mussel	✓	✓
		Atlantic salmon	✓	✓
		Sea lamprey	✓	✓
		River lamprey	✓	✓
		Twaite shad	✓	✓

Site code	Site name	Relevant qualifying interests	Physical presence	Underwater noise
SACs				
IE0000781	Slaney River Valley SAC	Freshwater pearl mussel	✓	✓
		Atlantic salmon	✓	✓
		Sea lamprey	✓	✓
		River lamprey	✓	✓
		Twaite shad	✓	✓
UK0030396	Bristol Channel Approaches SAC	Harbour porpoise	✓	✓
UK0030398	North Anglesey MarineSAC	Harbour porpoise	✓	✓
UK0030397	West Wales Marine SAC	Harbour porpoise	✓	✓
UK0030399	North Channel SAC	Harbour porpoise	✓	✓
SPAs				
IE0004002	Saltee Islands SPA	Northern fulmar	✓	×
		Lesser black-backed gull	✓	×
		Manx shearwater	✓	✓
		Northern gannet	✓	✓
IE0004003	Puffin Island SPA	Northern fulmar	✓	×
		Manx shearwater	✓	✓
IE0004005	Cliffs of Moher SPA	Northern fulmar	✓	×
IE0004007	Skelligs SPA	Northern fulmar	✓	×
		Manx shearwater	✓	✓
		Northern gannet	✓	✓
IE0004008	Blasket Islands SPA	Northern fulmar	✓	×
		Manx shearwater	✓	✓
IE0004021	Old Head of Kinsale SPA	Northern fulmar	✓	×
		Herring gull	✓	×
		Black-legged kittiwake	✓	×
		Common guillemot	✓	×
IE0004022	Ballycotton Bay SPA	Lesser black-backed gull	✓	×
IE0004023	Ballymacoda Bay SPA	Lesser black-backed gull	✓	×
IE0004028	Blackwater Estuary SPA	Lesser black-backed gull	✓	×
IE0004030	Cork Harbour SPA	Lesser black-backed gull	✓	×
IE0004032	Dungarvan Harbour SPA	Lesser black-backed gull	✓	×
IE0004066	The Bull and The Cow Rocks SPA	Northern fulmar	✓	×
		Northern gannet	✓	×
IE0004069	Lambay Island SPA	Northern fulmar	✓	×
		Manx shearwater	✓	✓
IE0004092	Tacumshin Lake SPA	Lesser black-backed gull	✓	×
IE0004095	Kilcolman Bog SPA	Lesser black-backed gull	✓	×
IE0004113	Howth Head Coast SPA	Northern fulmar	✓	×

Site code	Site name	Relevant qualifying interests	Physical presence	Underwater noise
SACs				
IE0004114	Illaunonearaun SPA	Northern fulmar	✓	×
IE0004119	Loop Head SPA	Northern fulmar	✓	×
IE0004117	Ireland's Eye SPA	Northern fulmar	✓	×
IE0004122	Skerries Islands SPA	Northern fulmar	✓	×
IE0004125	Magharee Islands SPA	Northern fulmar	✓	×
IE0004127	Wicklow Head SPA	Northern fulmar	✓	×
IE0004153	Dingle Peninsula SPA	Northern fulmar	✓	×
IE0004154	Iveragh Peninsula SPA	Northern fulmar	✓	×
IE0004155	Beara Peninsula SPA	Northern fulmar	✓	×
IE0004156	Sheep's Head to Toe Head SPA	Northern fulmar	✓	×
IE0004175	Deenish Island and Scariff Island SPA	Northern fulmar	✓	×
		Manx shearwater	✓	✓
IE0004189	Kerry Head SPA	Northern fulmar	✓	×
IE0004190	Galley Head to Duneen Point SPA	Northern fulmar	✓	×
IE0004191	Seven Heads SPA	Herring gull	✓	×
IE0004192	Helvick Head to Ballyquin SPA	Northern fulmar	✓	×
		Common guillemot	✓	✓
UK9014051	Skomer, Skokholm and the Seas off Pembrokeshire SPA	Lesser black-backed gull	✓	×
		Manx shearwater	✓	✓
UK9014041	Grassholm SPA	Northern gannet	✓	✓

4.2 Screening for likely significant effects

On the basis of the evidence presented in Sections 3 and 4 and the information given in Appendix 1, the potential for likely significant effects on the qualifying interests of the relevant sites (Table 4.1) is assessed below.

4.2.1 Physical presence of the survey vessel

Birds

The physical presence of the survey vessel may potentially cause displacement and/or other behavioural responses in birds. Most species from relevant SPAs within foraging range of the survey area have been judged to have a low to moderate sensitivity to disturbance by shipping traffic; these include northern gannet, fulmar, common guillemot, kittiwake, Manx shearwater and gulls (Garthe & Hüppop 2004, MMO 2008, Fleissbach *et al.* 2019). While rafting birds which are qualifying interests of sites may move in response to vessels in transit, such effects are of low magnitude and short duration (a single day), and will represent negligible additional disturbance over other vessel movements, including established routine supply and standby vessel activity at and around the KA and KB platforms, in addition to other traffic including that of fishing, cargo and tanker traffic. For example, a shipping study based on Automatic Identification System (AIS) data completed

for IOSEA4 (DCENR 2011) indicated that generally up to 300-750 vessels per year were present in waters off the south coast of Ireland and in the vicinity of the survey area (see other data sources including MMO 2014 and subsequent data updates, and EMODnet 2019[3]).

In view of the available evidence on the potential for the survey activities to generate disturbance to qualifying bird interests of relevant sites for which a potential interaction was identified, significant effects are not considered to be likely.

Fish and Marine Mammals

The physical presence of the vessel may influence the distribution and movements of sensitive species in the water column, specifically protected migratory fish (Atlantic salmon, sea lamprey, river lamprey, twaite shad) and marine mammals (harbour porpoise and grey seal). As hearing specialists, any displacement of marine mammals is most likely associated with acoustic disturbance, which is discussed below in Section 4.2.2. There may also be responses from marine mammals and fish to the general physical presence of vessels (Sparling *et al.* 2015), along with the risk of collisions from vessels in transit. However, the physical presence of the vessel around areas of existing activity, and its temporary presence (one day), are anticipated to cause no more than temporary and localised low-level behavioural responses similar to those from routine field operations and wider vessel traffic (as noted above), such that significant effects are not predicted.

4.2.2 Underwater noise

Noise sources and propagation

As outlined in Section 2, the planned survey will use one or more high-resolution geophysical survey (HRSG) sources to obtain information on the shallow geology around the Kinsale A and B platforms. All sources are electromechanical, with no airguns or sparkers (electrostatic discharge) to be used. All sources use a piezoelectric transducer(s) to transmit a computer-generated frequency-amplitude modulated signal of pre-determined pulse length and frequency. Chirp SBPs typically sweep through a range of frequencies from a lower bound of approximately 1-2kHz.

Calibrated measurements of the acoustic characteristics of electromechanical sources used in HRGS have, until recently, been lacking, with assessments reliant upon manufacturer specifications. However, a recent study commissioned by the US Bureau of Ocean Energy Management (BOEM) provided calibrated measurements of source characteristics under controlled test tank conditions for a variety of equipment used in HRGSs (Crocker & Fratantonio 2016, Crocker *et al*. 2019). Table 4.2 summarises indicative source characteristics of the equipment which will potentially be used in the planned Kinsale survey, drawing on results of Crocker & Fratantonio (2016) supplemented by manufacturer specifications where required. Source levels provided are those reported for the sources operated at the maximum power tested.

[3] https://www.emodnet-humanactivities.eu/search-results.php?dataname=Vessel+Density+ and https://www.emodnet-humanactivities.eu/search-results.php?dataname=Route+density+%28source%3A+EMSA%29

Table 4.2: Potential acoustic survey equipment and indicative source characteristics

Potential equipment	Indicative source characteristics		
	Nominal central operating Frequency	**Output power/source level**	**Beam width (degrees)**
Pinger SBP: Knudsen Pinger SBP	3.5kHz/15Hz	214dB re 1µPa @1m (peak) (1)	36-41(1)
Chirper SBP: Edgetech 3100	2-16kHz	176 dB re 1µPa @1m (peak) (2)	63 (3)
Chirper SBP: Knudsen Chirp 3260	3.5kHz	Up to 10kW; 214dB re 1µPa @1m (peak) (1)	36-41 e)
Parametric (non-linear) SBP: Innomar SES2000	Primary: 100kHz Secondary: 2-22kHz (planned = 2kHz-10kHz)	Primary: >240dB re 1µPa @1m (peak) Secondary: ~200dB re 1µPa @1m (peak)*	~2

*Notes: Source characteristics are manufacturer-specified unless stated otherwise. The following refer to calibrated measurements under controlled conditions reported in Crocker & Fratantonio (2016): (1) Indicative source level taken from comparable Knudsen 3202 operating at 3.5kHz and maximum power setting; (2) Indicative source level taken from Edgetech 3100 SBP system using 424 tow body with operational frequency of 4-26kHz; (3) Indicative beam width taken from comparable Edgetech 3200 system using 424 tow body with operational frequency of 2-15kHz. *The Innomar SES2000 is a non-linear/parametric sub-bottom profiler which transmits a high amplitude signal at two slightly different high frequencies; the interaction between these in the water column results in a secondary signal of much lower frequency and amplitude which is able to penetrate the seabed; peak amplitude of the secondary signal is estimated based on manufacturer specifications of similar equipment (e.g. Teledyne RESON ParaSound).*

The propagation of sound in the marine environment is complex and has been the subject of considerable research (e.g. Wang *et al*. 2014). Once a sound is emitted, its characteristics will be altered with distance from source. Changes will affect the amplitude of the signal and its frequency content and, in the case of impulsive sounds, the injurious elements will be reduced through propagation (i.e. pulse duration increases and rise-time decreases with distance). The main process that reduces the amplitude of the sound wave as it propagates is geometrical spreading; while a host of other processes come into play (e.g. reflection, refraction, scattering, reverberation and absorption), many of which are dependent on environmental conditions. The effect of frequency-dependent absorption loss is small on lower frequency sources (e.g. <0.3dB/km at 4kHz), which contributes to seismic survey noise being detectable by hydrophones hundreds of km from the source, but acts to rapidly attenuate higher frequency sources (e.g. 36dB/km at 100kHz) (Francois & Garrison 1982).

The propagation of noise from seismic surveys has undergone considerable investigation; while the process is complex and influenced by many variables, general expectations of broadband received levels from airguns can be made. In terms of peak sound pressure levels, while the nominal source levels for a large airgun array (250-260dB 1 µPa @1m, peak-to-peak) are never reached, levels >230dB re 1 µPa can be expected in close proximity (metres); levels are commonly reported to have decreased below 200dB re 1 µPa at a range of 100-1,000m, and below 160dB re 1 µPa at a range of 10-11km (e.g. Breitzke *et al*. 2008).

The emitted sound fields from HRGS sources such as SBPs can be expected to be of much lower amplitude and extent compared to seismic surveys using airguns due to their lower source levels, higher central operating frequencies and greater directionality (narrower beam widths) (e.g. Boebel et al. 2005, Genesis 2011). However, very few empirical field data are available to quantify these expectations. The most relevant work to date is part of the study funded by the US BOEM: following the calibrated measurements of Crocker & Fratantonio (2016), measurements were made in shallow (≤ 100m depth) open-water environments to investigate the propagation of sound from various HRGS sources (Halvorsen & Heaney

2018). Problems were encountered during the open-water testing resulting in a lack of calibration in the reported sound source levels (Labak 2019). The accompanying advice note (Labak 2019) emphasises that these uncalibrated data should not be used to provide source level measurements, and consequently the reported isopleths (summarising sound propagation) should not replace project-specific sound source verifications. A further project to calibrate these measures and provide an expanded assessment of propagation commenced in 2019.

Despite these caveats, it is worth noting some general patterns observed in Halvorsen & Heaney (2018). In all test environments, broadband received levels from all SBP chirper[4] devices (along with echosounders and side-scan sonar) tested were rapidly attenuated with distance from source, with particularly pronounced fall-off for directional sources when the receiver was outside of the source's main beam. The greatest propagation was generally observed at the deepest test site (100m water depth) from sources generating low frequencies (<10kHz); by contrast, at 100m water depth, some of the highest frequency sources (>50kHz) experienced such attenuation that they were only weakly detectable or undetected by recording equipment. In all open-water test environments, broadband received levels did not exceed 160dB re 1µPa (rms)[5] beyond 200m from any chirper SBP (or echosounder or side-scan sonar) device tested. While recognising that these results require refining, preliminary evidence suggests that electromechanical SBPs generate a very limited sound field in the marine environment, and of a much lower magnitude than those generated by seismic airgun sources.

It is noted that neither BOEM studies tested a parametric SBP, and that this potential source has the highest indicative source level of those listed in Table 5.1. The mechanism by which these devices generate the low-frequency signal of interest (secondary) requires initial emission of a high amplitude signal (primary). However, the high frequency of this initial signal and its associated narrow beam width will limit its horizontal propagation; in the absence of empirical measurements, a similar pattern to that observed by Halvorsen & Heaney (2018) for chirper SBPs and echosounders can be reasonably assumed for a parametric SBP of this specification.

In generic terms, underwater noise emitted by small leisure craft and vessels <50m tends to have a source level of 160-175 dB re 1µPa@1m, and with greater sound energy in relatively higher frequency (above 1kHz) when compared to large ships; support and supply vessels (50-100m) are expected to have source levels in the range 165-180dB re 1µPa@1m range and with most energy in lower frequencies (OSPAR 2009). For the purpose of this noise assessment, the survey vessel is assumed to be of 50-100m in length. Veirs *et al*. (2016) estimated sound characteristics for a wider variety of ships (from pleasure craft to container ships) in transit across the Haro Strait (west coast of North America). Median received levels of ship noise within the study area were measured to be most elevated above ambient noise at the lower frequencies (20-30dB from 100-1,000Hz), and to a lesser extent also at higher frequencies (5-13dB from 10-40kHz).

Cavitational noise commonly arises at speeds between 8 and 12 knots and grows in amplitude with increasing speed; its frequency spectrum is broad with dominant frequencies above a few hundred Hz. In addition to vessels in transit, cavitational noise is important

[4] While no device marketed as a 'pinger' was tested, one chirper SBP tested had very similar specifications to the Knudsen Pinger SBP and so results can be considered applicable to this potential source in the planned Kinsale survey.

[5] The 160dB re 1µPa (rms) isopleth represents the acoustic exposure criterion for behavioural disruption from impulsive noise as described by NMFS (2016), although this criterion is not adopted in policy or guidance in Ireland or the UK.

when vessels are operating under high load conditions (high thrust) and when dynamic positioning (DP) systems are in use. For example, the use of thrusters for DP has been reported to result in increased sound generation of ~10dB compared to the same vessel in transit: measurements at 600m range to an offshore supply vessel of 79m length recorded broadband SPL (18-3,000Hz) of 148.0dB re 1µPa (root-mean-squared, rms) when in DP mode, compared to 135.5dB re 1µPa rms when in transit at a speed of 10 knots (Rutenko & Ushchipovskii 2015).

Acoustic modelling in support of oil & gas operations have shown that across a variety of vessels, activities and localities, exposure to sound pressure level (SPL) above >180 dB re 1 µPa rms is highly unlikely; SPL >160 dB re 1 µPa rms are encountered only within the immediate vicinity of the activity (<50m) while SPL >120 dB re 1 µPa rms are encountered up to a few kilometres (Neptune LNG 2016, Fairweather 2016, Owl Ridge Natural Resource Consultants 2016).

Marine mammals

Marine mammals, for which sound is fundamental across a wide range of critical natural functions, show high sensitivity to underwater sound. Generally, the severity of effects tends to increase with increasing exposure to noise with both sound intensity and duration of exposure being important. A distinction can be drawn between effects associated with physical (including auditory) injury and effects associated with behavioural disturbance. With respect to injury, risk from an activity can be assessed using threshold criteria of sound levels, with the most recent criteria presented in Southall *et al.* (2019). Auditory capabilities, and in particular the range of frequencies over which sensitivity is greatest, varies between species and criteria are assigned to functional hearing groups with accompanying injury criteria. Table 4.3 provides details of the relevant marine mammals (i.e. those which are qualifying interests of relevant sites) listed by functional hearing group, their estimated hearing range and recommended injury criteria, defined as the sound level at which a permanent threshold shift (PTS; permanent hearing damage) is estimated to occur.

Table 4.3: Marine mammal auditory injury criteria to pulsed sounds by functional hearing group

Functional hearing group (species relevant to the Kinsale area)	**Estimated hearing range** (region of greatest sensitivity) [frequency of peak sensitivity]	**Proposed injury (PTS onset) threshold criteria to impulsive noise** (dB re 1µPa, peak, unweighted)
Very high frequency cetaceans Harbour porpoise (*Phocoena phocoena)*	275Hz to 160kHz (12kHz to 140kHz) [105kHz]	202
Pinnipeds in water Grey seal (*Halichoerus grypus*) Harbour seal (*Phoca vitulina*)	50Hz to 86kHz (1.9kHz to 30kHz) [13kHz]	218

Source: Southall et al. (2019). Notes: The region of greatest sensitivity represents parameters f1 and f2, which are the bounds of the flat, central portion of the frequency-weighting curve region; the frequency of peak sensitivity represents parameter f0.

Of the species likely to occur in the survey area, the harbour porpoise has the lowest threshold criteria for the onset of PTS at 202dB re 1µPa. Given the source characteristics and evidence of propagation presented above, the potential sources in the planned Kinsale survey will either not generate source levels of this amplitude (Edgetech 3100 chirper SBP), or will not result in received sound levels exceeding this threshold beyond more than a few metres from the source. For all other species/functional hearing groups including pinnipeds,

the criteria for the onset of PTS is higher than source levels for all potential equipment, with the exception of the parametric SBP (Innomar SES3000) which is characterised by a narrower beam width (~2°) and higher frequency (100kHz) than other sources, resulting in a very small area beneath this source being ensonified to the extent that injury to a marine mammal may occur. Therefore, **the risk of injury to marine mammals which are qualifying interests of relevant SACs (Section 4.1.1) is considered to be negligible, and significant effects are not considered to be likely**.

With respect to behavioural disturbance of marine mammals, it has proved much more difficult to establish broadly applicable threshold criteria based on exposure alone. This is due, in part, to the challenges encountered in studies of wide-ranging species with complex behaviour, but is largely because many behavioural responses are context-specific (e.g. Gomez *et al*. 2016*,* Harding *et al*. 2019). Field observations during industrial activities are fundamental sources of information for assessment. For harbour porpoise, there is empirical evidence to support a temporary effective deterrence radius around seismic survey of approximately 10km, with Thompson *et al.* (2013a & b) using passive acoustic monitoring (PAM) to observe a reduction in harbour porpoise density within 5-10km of a 470in^3 airgun array in the Moray Firth, with animals returning 19 hours after exposure ceased. More recently, Sarnocińska *et al.* (2020) also used PAM to observed a dose-response effect among porpoise activity and 3D seismic survey in the Danish North Sea using a 3,570in^3 airgun array. The lowest porpoise activity was recorded closest to the source vessel increasing up to a range of 8-12km, beyond which baseline acoustic activity was observed. No long-term or large-scale displacements were observed throughout the survey.

Consistent with the findings of Thompson *et al*. (2013a & b), the most recent UK Offshore Energy SEA (OESEA3, DECC 2016) concludes that a conservative assessment of the potential for marine mammal disturbance from seismic surveys will assume that firing of airguns will affect individuals within 10km of the source, resulting in changes in distribution and a reduction of foraging activity, but the effect is short-lived. The applicability of this value of 10km to other marine mammals is justified by harbour porpoise showing greater sensitivity to hearing damage and apparently stronger responses to anthropogenic noise than other species commonly occurring in UK shelf waters. A 10km Effective Deterrence Radius (EDR) has also been suggested by UK Statutory Nature Conservation Bodies as an appropriate approach to assessing disturbance due to seismic surveys.

In comparison to the work on seismic airguns, potential effects from other acoustic surveys such as SBPs on marine mammals, or any other marine fauna, have received much less attention. Empirical studies of responses are lacking. Consideration of the higher frequency signals, typically lower source levels and higher directionality of these and other HRGS sources has resulted in the assumption that these would not propagate far enough for marine species to be negatively affected by received levels (Halvorsen & Heaney 2018). However, a precautionary approach has been adopted where it is acknowledged that such sources are within the hearing range of marine mammals and therefore could, in a few cases, cause localised short-term impacts on behaviour or temporary displacement of a small number of individuals (Boebel *et al*. 2005). The aforementioned results of recent BOEM studies into source characteristics and preliminary evidence of propagation appear to support this assertion.

Underwater noise from the survey vessel itself could potentially cause behavioural disturbance of marine mammals present in the area. Reported responses include avoidance, changes in swimming speed, direction and surfacing patterns, alteration of the intensity and frequency of calls (review Erbe *et al*. 2019). Harbour porpoises and minke whales have been shown to respond to survey vessels by moving away from them, while

some other species, such as common dolphins, have shown attraction (Palka & Hammond 2001).

While there is potential for some behavioural disturbance of cetaceans in response to survey vessel noise, the area of potential disturbance will be highly localised (i.e. within a few hundred metres radius), in an open sea habitat (i.e. with movement of animals not restricted by geographic features such as a shoreline), transient and of very short overall duration. The increase in underwater noise from the survey vessel activities, relative to existing levels in the wider area from other shipping and fisheries, is expected to be negligible.

The waters off the south coast of Ireland support a high diversity of cetaceans, which include harbour porpoise, during the period April-September within which the survey is planned. However, considering the acoustic characteristics of the potential sources and their propagation, the relevant evidence of effects on marine mammals from vessel noise, seismic survey and the proportionally lower potential for effects of the specific sources being used, in addition to the small spatial footprint and short duration (less than one day) of the planned survey, **the risk of behavioural disturbance to any species of marine mammal which is a qualifying interest of a relevant SAC (Section 4.1.1) is considered to be extremely low, and significant effects are not considered to be likely.**

All operations will be conducted in daylight. The DAHG "Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters" (DAHG 2014) includes plan/project-specific guidance on Geophysical Acoustic Surveys in section 4.3.4. The measures outlined are applicable to "all multibeam, single beam, side-scan sonar and sub-bottom profiler (e.g., pinger or chirp system) surveys within bays, inlets or estuaries and within 1,500m of the entrance of enclosed bays/inlets/estuaries;". For the avoidance of doubt, it is confirmed that the proposed survey is outside, and substantially more than 1,500m from the entrance of any enclosed bay, inlet or estuary and so does not fall within the requirement specified in the guidance.

Fish

Fish exhibit large variation in their response to sound, largely due to the great diversity in anatomical features, hearing physiology and behaviour; all species respond to particle motion, but several have adaptations that make them sensitive also to the pressure component of sound. Most species can detect sounds from <50Hz to a few hundred Hz, with some extending this range to approximately 500Hz (e.g. cod, saithe), and those with specialisations to be sensitive to sound pressure being able to detect sounds up to several kHz (e.g. herring) (review in Hawkins & Popper 2017). Broadly applicable sound exposure criteria have been published (Popper *et al.* 2014); the criteria for mortality and potential injury from seismic survey noise for species lacking a swim bladder (sensitive to particle motion only) is >213dB re 1 µPa (peak) and for all other groups is >207dB re 1 µPa (peak).

There have been numerous reviews of the effects of anthropogenic sound on fish (e.g. Popper *et al*. 2014, Hawkins *et al*. 2015, Slabbekoorn *et al*. 2019). Of relevance is Carroll *et al*. (2017), who present a systematic and critical review of scientific studies investigating the impacts of low-frequency sound on marine fish, with a focus on seismic surveys. Of studies investigating adult/juvenile fish mortality and physical injury, the majority showed no effects, some reported temporary hearing loss and one observed long-term hearing damage; none showed mortality. None of six studies investigating mortality of fish eggs or larvae reported mortality at realistic known exposure levels. Behavioural effects are the most studied aspect, numbering 15 studies, with most being laboratory or caged field experiments. Startle/alarm responses, avoidance of the sound source or changes in vertical or horizontal distribution were widely reported, while several studies reported no significant response or

conflicting results. Observed responses were temporary, and fish returned to pre-exposure behaviour typically within less than an hour of the last exposure. The majority of studies of effects on catch rates or abundance report no effect or conflicting results, although in some cases reduced trawl and/or longline catch occurred; where effects have been reported, these are most likely due to changes in fish distribution and behaviour, such as vertical movements.

As key prey items of fish, there has been increasing interest in the potential effects of seismic and other high amplitude low-frequency noise on plankton. McCauley *et al*. (2017) reported a significant decrease in zooplankton abundance and a significant increase in mortality of adult and larval zooplankton, particularly krill, following repeated exposure to a 150in^3 airgun. By contrast, Fields *et al*. (2019) found only limited effects on mortality of the copepod *Calanus finmarchicus* (a key food source of commercial fish in the North Atlantic) when exposed to single blasts of a 2x260in^3 airgun cluster. While studies are limited, and further investigation is required, most evidence to date suggests negligible effects on plankton from exposure to seismic survey noise (Carroll *et al*. 2017); it is reasonable to infer that the potential for effects from lower-amplitude acoustic surveys sources will be proportionally less.

Given the reported hearing ranges of fish, it is anthropogenic sound sources generating high amplitude low-frequency noise (i.e. seismic airgun surveys, along with percussive pile-driving and explosions) which are of primary concern to fish. Studies which have experimentally tested the effects of other fairly low-frequency acoustic survey sources (i.e. SBPs) on fish are lacking. Chirper and pinger SBPs, and the secondary signal of the parametric SBP potential source, show limited overlap only among fish species which primarily detect sound pressure, such as herring. The high frequency primary signal generated by the parametric SBP, at ~100kHz, is above the hearing range of fish.

Given the limited evidence of physical injury to fish from exposure to high amplitude low-frequency seismic survey noise, and the comparatively lower amplitude and higher frequency source characteristics of the potential sources in the planned Kinsale survey, **the risk of injury to any fish species which is a qualifying interest of a relevant SAC (Section 4.1.1) is considered to be extremely remote and significant effects are not considered to be likely.**

Given the limited and variable evidence of behavioural responses of fish to high amplitude low-frequency seismic survey noise (which are low-level and short-term), the comparative characteristics of the potential sources in the planned Kinsale survey, in addition to the small spatial footprint and short duration (less than one day) of the planned survey, **the risk of significant effects on any fish species which is a qualifying interest of a relevant SAC (Section 4.1.1) due to behavioural disturbance is considered to extremely low.**

Diving birds

Information on the underwater hearing abilities of diving birds and evidence of the effects of underwater anthropogenic noise is very limited. Direct effects from underwater acoustic surveys on diving birds could potentially occur through physical damage, given exposure to sufficiently high amplitudes, or through behavioural disturbance. Deeper-diving species which spend longer periods of time underwater (e.g. auks) may be most at risk of exposure, but all species which routinely submerge in pursuit of prey and benthic feeding opportunities in marine and estuarine habitats (i.e. also including divers *Gavia spp*., grebes, diving ducks, cormorant, shag, gannet, and Manx shearwater) may be exposed to anthropogenic noise.

Tests of hearing in a range of diving species suggest a hearing range of approximately 500Hz to 4kHz, with similar results obtained in air and underwater (Crowell 2014, Crowell e*t al.* 2015, Hansen *et al*. 2017). McCauley (1994) inferred from vocalisation ranges that the threshold of perception for low frequency seismic noise in some species (e.g. penguins, considered as a possible proxy for auk species) would be high, hence individuals might be adversely affected only in close proximity to the source.

Very high amplitude low frequency underwater noise may result in acute trauma to diving seabirds, with several studies reporting mortality of diving birds in close proximity (i.e. tens of metres) to underwater explosions (Yelverton *et al*. 1973, Cooper 1982, Stemp 1985, Danil & St Leger 2011). However, mortality of seabirds has not been reported during extensive seismic operations in the North Sea and elsewhere.

With the exception of Pichegru *et al*. (2017), which relates to penguins, there are no published reports of changes in abundance or distribution of diving birds concurrent with seismic or other acoustic survey activity. A study investigated seabird abundance in Hudson Strait (Atlantic seaboard of Canada) during seismic surveys over three years (Stemp 1985). Comparing periods of shooting and non-shooting, no significant difference was observed in abundance of thick-billed murre (Brünnich's guillemot), or fulmar or kittiwake.

While seabird responses to approaching vessels are highly variable (e.g. Fleissbach *et al*. 2019), flushing disturbance would be expected to displace most diving seabirds from close proximity to the survey vessel and any towed equipment, thereby limiting their exposure to the highest sound pressures generated. Similarly, any behavioural disturbance of seabirds due to the survey activities is most likely to be temporary displacement associated with the physical presence of the vessel, comparable to that experienced by routine shipping traffic (see Section 4.2.1).

While acknowledging limited data and the importance of the Kinsale area to several species of diving birds which are qualifying interests of relevant SPAs (i.e. guillemot, razorbill, northern gannet and Manx shearwater), a consideration of the lack of reported effects of seismic survey on diving birds, the comparatively lower amplitude source characteristics of the potential sources in the planned Kinsale survey, in addition to the small spatial footprint and short duration of the planned survey, leads to the conclusion that **significant effects on diving birds are considered to be highly unlikely.**

4.3 In-combination effects

Sources of potential in-combination effects included a range of other activities which take place within the wider Kinsale area, including fisheries and shipping, for which the addition of a single vessel for one day, within the statutory exclusion zone around the platforms, is not considered to represent a significant source of in-combination effect.

Exola DAC, a subsidiary of Providence Resources plc has applied for approval for a site survey in the Barryroe field (licence area SEL 1/11), some 25km from the Kinsale Bravo platform. The survey is planned for between April and November 2020 or between February and November 2021. The geophysical survey equipment comprises side scan sonar, single-beam & multi-beam echosounders, pinger SBP, USBL and magnetometer, and the survey is anticipated to take about 1.5 days. The Appropriate Assessment Screening and Natura Impact Statement (Exola 2020) for the proposed Barryroe K site survey concluded that the survey was not likely to adversely affect (either directly or indirectly) the integrity of any European site, either alone or in combination with other plans or projects, with no reasonable scientific doubt in relation to this conclusion. The proposed Barryroe survey overlaps with

the 500m safety exclusion zones of 2 Seven Heads field wells. Exola requires prior permission from Kinsale Energy to enter these zones, this will allow coordination of timing of the 2 surveys such that in-combination effects would be avoided.

Marine Notice No. 11 of 2020 advises of several surveys to be undertaken in 2020 to the south and southwest of Ireland. These surveys are part of the INFOMAR Programme (Integrated Mapping for the Sustainable Development of Ireland's Marine Resource), a jointly managed seabed mapping initiative between the Geological Survey Ireland (GSI) and the Marine Institute, funded by DCCAE. Between April and October GSI's R.V.s *Keary*, *Geo*, *Mallet* and *Lir* will operate in the Celtic Sea, including a survey area covering the Kinsale Head and Seven Heads fields. Details of the GSI survey equipment are not provided and Kinsale Energy will liaise with GSI on the timing of the various surveys with the aim of avoiding potential in-combination effects.

Other proposed projects in the wider Kinsale Area include the Celtic Interconnector and Ireland-France subsea cable. The timing of any works associated with these projects is not considered likely to interact with the proposed survey schedule, and in view of the nature and scale of potential effects associated with the survey (Section 4), significant in-combination effects are not considered to be likely.

This survey is a precursor to work to be undertaken to decommission certain aspects of the Kinsale facilities, and no interaction with activities associated with the currently approved decommissioning programme are possible.

Kinsale Energy also propose to undertake a survey covering the wider Kinsale Area fields of South West Kinsale, Ballycotton and Seven Heads incorporating MBES, SSS, magnetometer and sub-bottom profiler, which will be subject to a separate application. Kinsale Energy will ensure that the survey schedules are such that there will be no temporal overlap such that cumulative effects are not considered to be likely.

5 AA SCREENING STATEMENT AND CONCLUSIONS

This Screening for Appropriate Assessment has been prepared according to the process and requirements outlined in the *European Communities (Birds and Natural Habitats) Regulations 2011* and the Habitats Directive and is consistent with European (European Commission 2019) (see Figure 1.2 of this document) and national (DoEHLG 2010) guidance, and relevant case law. The screening assessment was carried out in accordance with best published scientific knowledge, and taking into consideration each of the relevant sites' conservation objectives, to ascertain if the proposed survey, on its own or in-combination with any other known plan or project, would be likely to have a significant effect on any of the relevant Natura 2000 sites. For the avoidance of doubt, it is confirmed that measures intended to avoid or reduce impacts on any European Site were not considered as part of the screening assessment carried out.

The conclusion of the Screening for Appropriate Assessment is that the activities associated with the proposed survey (see Section 2) will not result in any likely significant effects (either alone or in-combination with other plans or projects) on the features or conservation objectives of any relevant Natura 2000 site (see Section 3). This conclusion is based on objective scientific evidence and there is no reasonable scientific doubt in relation to this conclusion.

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APPENDIX 1: NATURA 2000 SITE INFORMATION

The tabulations in this Appendix contain lists of the qualifying interests for each Natura 2000 site for which a potential interaction has been identified (Table 4.1) and those features of relevance to the survey programme. Additional information on site conservation objectives is also provided, which along with the qualifying interests inform a consideration of the nature of the interaction with the potential sources of likely significant effect.

Special Areas of Conservation (SAC)

Site Name: Roaringwater Bay and Islands SAC
Site Code: 000101

Site information

Relevant qualifying interests: Large shallow inlets and bays, reefs, vegetated sea cliffs of the Atlantic and Baltic coasts, harbour porpoise *Phocoena phocoena*, otter *Lutra lutra*, grey seal *Halichoerus grypus*, European dry heaths, submerged or partly submerged sea caves

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: harbour porpoise *Phocoena phocoena,* grey seal *Halichoerus grypus*

Summary Conservation objectives:

- To maintain the favourable conservation condition of large shallow inlets and bays
- To maintain the favourable conservation condition of reefs
- To maintain the favourable conservation condition of vegetated sea cliffs of the Atlantic and Baltic coasts
- To maintain the favourable conservation condition of harbour porpoise
- To restore the favourable conservation condition of otter
- To maintain the favourable conservation condition of grey seal
- To maintain the favourable conservation condition of European dry heaths
- To maintain the favourable conservation condition of submerged or partly submerged sea caves

Feature attributes and targets defining favourable conservation status:
https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000101.pdf

Closest distance (km) to the survey: 97km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
The survey will result in a small increase in vessel traffic within the wider Kinsale Area (a single vessel for one day in the period April to September 2019. With respect to potentially sensitive qualifying species (e.g. harbour porpoise and grey seal) these are expected to cause no more than temporary and localised low-level behavioural responses similar to those from normal Kinsale offshore operations or shipping activity in the Kinsale and wider Celtic Sea areas. However, given the potential presence of these qualifying species the survey area there is the potential for interaction which is considered further in Section 4.2.1.

Underwater noise from vessel and survey activities
The primary contributor to underwater noise is from the use of survey equipment (one or more high-resolution geophysical survey (HRSG) sources). Given the potential presence of noise-sensitive qualifying species (e.g. harbour porpoise and grey seal) in the survey area, there is the potential for interaction which is considered further in Section 4.2.2.

Site Name: Blasket Islands SAC
Site Code: 0002172

Site information

Relevant qualifying interests: reefs, vegetated sea cliffs of the Atlantic and Baltic coasts, harbour porpoise *Phocoena phocoena*, otter *Lutra lutra*, grey seal *Halichoerus grypus*, European dry heaths, submerged or partly submerged sea caves

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: harbour porpoise *Phocoena phocoena*

Summary Conservation objectives:

- To maintain the favourable conservation condition of reefs
- To restore the favourable conservation condition of vegetated sea cliffs of the Atlantic and Baltic coasts
- To maintain the favourable conservation condition of harbour porpoise
- To restore the favourable conservation condition of otter
- To maintain the favourable conservation condition of grey seal
- To maintain the favourable conservation condition of European dry heaths
- To maintain the favourable conservation condition of submerged or partly submerged sea caves

Feature attributes and targets defining favourable conservation status:
https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002172.pdf **Further supporting information on the site conservation objectives:**
https://www.npws.ie/sites/default/files/publications/pdf/Blasket%20Islands%20SAC%20(002172)%20Conservation%20objectives%20supporting%20document%20-%20Marine%20habitats%20[Version%201]_1.pdf

Closest distance (km) to the survey: 212km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
The survey will result in a small increase in vessel traffic within the wider Kinsale Area (a single vessel for one day in the period April to September 2019. With respect to potentially sensitive qualifying species (harbour porpoise) these are expected to cause no more than temporary and localised low-level behavioural responses similar to those from normal Kinsale offshore operations or shipping activity in the Kinsale and wider Celtic Sea areas. However, given the potential presence of these qualifying species the survey area there is the potential for interaction which is considered further in Section 4.2.1.

Underwater noise from vessel and survey activities
The primary contributor to underwater noise is from the use of survey equipment (one or more high-resolution geophysical survey (HRSG) sources). Given the potential presence of noise-sensitive qualifying species (harbour porpoise) in the survey area, the potential for likely significant effect is considered further in Section 4.2.2.

Site Name: Rockabill to Dalkey Island SAC
Site Code: 0003000

Site information

Relevant qualifying interests: reefs, *Phocoena phocoena*

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: harbour porpoise *Phocoena phocoena*

Summary Conservation objectives:

- To maintain the favourable conservation condition of reefs
- To maintain the favourable conservation condition of harbour porpoise

Site Name: Rockabill to Dalkey Island SAC
Site Code: 0003000

Feature attributes and targets defining favourable conservation status:
https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO003000.pdf **Further supporting information on the site conservation objectives:**
https://www.npws.ie/sites/default/files/publications/pdf/003000_Rockabill%20to%20Dalkey%20Island%20SAC%20Marine%20Supporting%20Doc_V1.pdf

Closest distance (km) to the survey: 265km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
The survey will result in a small increase in vessel traffic within the wider Kinsale Area (a single vessel for one day in the period April to September 2019. With respect to potentially sensitive qualifying species (harbour porpoise) these are expected to cause no more than temporary and localised low-level behavioural responses similar to those from normal Kinsale offshore operations or shipping activity in the Kinsale and wider Celtic Sea areas. However, given the potential presence of these qualifying species the survey area there is the potential for interaction which is considered further in Section 4.2.1.

Underwater noise from vessel and survey activities
The primary contributor to underwater noise is from the use of survey equipment (one or more high-resolution geophysical survey (HRSG) sources). Given the potential presence of noise-sensitive qualifying species (harbour porpoise) in the survey area, the potential for likely significant effect is considered further in Section 4.2.2.

Site Name: Bandon River SAC
Site Code: 0002171

Site information

Relevant qualifying interests: Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation, alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)*, freshwater pearl mussel *Margaritifera margaritifera*, brook lamprey *Lampetra planeri*

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: freshwater pearl mussel *Margaritifera margaritifera*

Summary Conservation objectives:

- To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected.

Feature attributes and targets defining favourable conservation status:
Not listed - https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002171.pdf

Closest distance (km) to the survey: 49km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
While supporting a population of Atlantic salmon, this is not a qualifying interest of the site. As Atlantic salmon forms a critical part of the lifecycle of the freshwater pearl mussel interest feature, it is considered here as if it were an interest feature. With respect to this potentially sensitive species, survey activities would be expected to cause no more than temporary and localised low-level behavioural responses similar to those from normal Kinsale offshore operations and wider shipping activity in the Kinsale and Celtic Sea areas, and the potential for significant effects on the site has therefore not been identified.

Underwater noise from vessel and survey activities
As above, in view of the freshwater pearl mussel interest feature, the potential for interaction with Atlantic salmon is considered here. The primary contributor to underwater noise from the survey will

Site Name: Bandon River SAC
Site Code: 0002171

be vessel activity and noise associated with the survey equipment. In view of the qualifying interest dependency on a potentially noise sensitive feature (Atlantic salmon), the potential for likely significant effect is considered further in Section 4.2.2.

Site Name: Blackwater River (Cork/Waterford) SAC
Site Code: 0002170

Site information

Relevant qualifying interests: Freshwater pearl mussel *Margaritifera margaritifera*, white-clawed crayfish *Austropotamobius pallipes*, sea lamprey *Petromyzon marinus*, brook Lamprey *Lampetra planeri*, river lamprey *Lampetra fluviatilis*, twaite shad *Alosa fallax*, Atlantic salmon *Salmo salar* (only in fresh water), estuaries, mudflats and sandflats not covered by seawater at low tide, perennial vegetation of stony banks, *Salicornia* and other annuals colonizing mud and sand, Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*), otter, Mediterranean salt meadows (*Juncetalia maritimi*), Killarney fern *Trichomanes speciosum*, water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation, old sessile oak woods with *Ilex* and *Blechnum* in the British Isles, alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*), *Taxus baccata* woods of the British Isles.

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: sea lamprey *Petromyzon marinus*, river lamprey *Lampetra fluviatilis*, twaite shad *Alosa fallax*, Atlantic salmon *Salmo salar*, freshwater pearl mussel *Margaritifera margaritifera*

Summary Conservation objectives:

- To restore the favourable conservation condition of the freshwater pearl mussel
- To maintain the favourable conservation condition of white-clawed crayfish
- To restore the favourable conservation condition of sea lamprey
- To maintain the favourable conservation condition of brook lamprey
- To maintain the favourable conservation condition of river lamprey
- To restore the favourable conservation condition of twaite shad
- To maintain the favourable conservation condition of Atlantic salmon
- To maintain the favourable conservation condition of estuaries
- To maintain the favourable conservation condition of mudflats and sandflats not covered by seawater at low tide
- To maintain the favourable conservation condition of perennial vegetation of stony banks
- To maintain the favourable conservation condition of *Salicornia* and other annuals colonizing mud and sand
- To restore the favourable conservation condition of Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
- To restore the favourable conservation condition of otter
- To maintain the favourable conservation condition of Mediterranean salt meadows (*Juncetalia maritimi*)
- To maintain the favourable conservation condition of Killarney fern
- To maintain the favourable conservation condition of water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation
- To restore the favourable conservation condition of old sessile oak woods with *Ilex* and *Blechnum*
- To restore the favourable conservation condition of alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)*
- The status of *Taxus baccata* woods of the British Isles as a qualifying Annex I habitat for the Blackwater River (Cork/Waterford) SAC is currently under review.

Feature attributes and targets defining favourable conservation status:
https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002170.pdf

Site Name: Blackwater River (Cork/Waterford) SAC
Site Code: 0002170

Closest distance (km) to the survey: 64km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
The survey will result in a small increase in vessel traffic (a single vessel), being present for one day during April-September 2020. With respect to potentially sensitive qualifying species (e.g. sea lamprey, river lamprey, twaite shad, Atlantic salmon and by association the freshwater pearl mussel) these are expected to cause no more than temporary and localised low-level behavioural responses similar to those from current normal Kinsale offshore operations and wider shipping activity in the Kinsale and Celtic Sea areas. However, given the migratory nature of some of the qualifying species, there is the potential for interaction with site qualifying interests, which are considered further in Section 4.2.1.

Underwater noise from vessel and survey activities
The primary contributor to underwater noise from the survey will be vessel activity and noise associated with the survey equipment. In view of the potential noise sensitivity of qualifying interests which have the potential to occur in or near the survey area (e.g. Atlantic salmon, sea lamprey), the potential for likely significant effect is considered further in Section 4.2.2.

Site Name: River Barrow and River Nore SAC
Site Code: 0002162

Site information

Relevant qualifying interests: Desmoulin's whorl snail *Vertigo moulinsiana*, freshwater pearl mussel *Margaritifera margaritifera*, white-clawed crayfish *Austropotamobius pallipes*, sea lamprey *Petromyzon marinus*, brook lamprey *Lampetra planeri*, river lamprey *Lampetra fluviatilis*, twaite shad *Alosa fallax*, Atlantic salmon *Salmo salar* (only in fresh water), estuaries, mudflats and sandflats not covered by seawater at low tide, *Salicornia* and other annuals colonizing mud and sand, Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*), otter *Lutra lutra*, Mediterranean salt meadows (*Juncetalia maritimi*), Killarney fern *Trichomanes speciosum*, Nore freshwater pearl mussel *Margaritifera durrovensis*, water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation, European dry heaths, hydrophilous tall herb fringe communities of plains and of the montane to alpine levels, petrifying springs with tufa formation (*Cratoneurion*), old sessile oak woods with *Ilex* and *Blechnum* in the British Isles alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: sea lamprey *Petromyzon marinus*, river lamprey *Lampetra fluviatilis*, twaite shad *Alosa fallax*, Atlantic salmon *Salmo salar*, freshwater pearl mussel *Margaritifera margaritifera*

Summary Conservation objectives:

- The status of the freshwater pearl mussel (*Margaritifera margaritifera*) as a qualifying Annex II species for the River Barrow and River Nore SAC is currently under review.
- To maintain the favourable conservation condition of white-clawed crayfish
- To restore the favourable conservation condition of sea lamprey
- To restore the favourable conservation condition of brook lamprey
- To restore the favourable conservation condition of river lamprey
- To restore the favourable conservation condition of twaite shad
- To restore the favourable conservation condition of salmon
- To maintain the favourable conservation condition of estuaries
- To maintain the favourable conservation condition of the mudflats and sandflats not covered by seawater at low tide
- To maintain the favourable conservation condition of *Salicornia* and other annuals colonizing mud and sand
- To restore the favourable conservation condition of Atlantic salt meadows

Site Name: River Barrow and River Nore SAC
Site Code: 0002162

- To restore the favourable conservation condition of otter
- To restore the favourable conservation condition of Mediterranean salt meadows
- To maintain the favourable conservation condition of Killarney fern
- To restore the favourable conservation condition of the Nore freshwater pearl mussel
- To maintain the favourable conservation condition of water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation
- To maintain the favourable conservation condition of European dry heaths
- To maintain the favourable conservation condition of hydrophilous tall herb fringe communities of plains and of the montane to alpine levels
- To maintain the favourable conservation condition of petrifying springs with tufa formation (*Cratoneurion*)
- To restore the favourable conservation condition of old oak woodland with *Ilex* and *Blechnum*
- To restore the favourable conservation condition of alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)*

Feature attributes and targets defining favourable conservation status:
https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002162.pdf

Closest distance (km) to the survey: 114km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
The survey will result in a small increase in vessel traffic (a single vessel), being present for one day during April-September 2020. With respect to potentially sensitive qualifying species (e.g. sea lamprey, river lamprey, twaite shad, Atlantic salmon and by association the freshwater pearl mussel) these are expected to cause no more than temporary and localised low-level behavioural responses similar to those from current normal Kinsale offshore operations and wider shipping activity in the Kinsale and Celtic Sea areas. However, given the migratory nature of some of the qualifying species, there is the potential for interaction with site qualifying interests, which are considered further in Section 4.2.1.

Underwater noise from vessel and survey activities
The primary contributor to underwater noise from the survey will be vessel activity and noise associated with the survey equipment. In view of the potential noise sensitivity of qualifying interests which have the potential to occur in or near the survey area (e.g. Atlantic salmon, sea lamprey), the potential for likely significant effect is considered further in Section 4.2.2.

Site Name: Lower River Suir SAC
Site Code: 0002137

Site information

Relevant qualifying interests: Freshwater pearl mussel *Margaritifera margaritifera*, white-clawed crayfish *Austropotamobius pallipes*, sea lamprey *Petromyzon marinus*, brook lamprey *Lampetra planeri*, river lamprey *Lampetra fluviatilis*, twaite shad *Alosa fallax*, Atlantic salmon *Salmo salar*, Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*), otter *Lutra lutra*, Mediterranean salt meadows (*Juncetalia maritimi*), water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation, hydrophilous tall herb fringe communities of plains and of the montane to alpine levels, old sessile oak woods with *Ilex* and *Blechnum* in the British Isles, alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*), *Taxus baccata* woods of the British Isles.

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: sea lamprey *Petromyzon marinus*, river lamprey *Lampetra fluviatilis*, twaite shad *Alosa fallax*, Atlantic salmon *Salmo salar*, freshwater pearl mussel *Margaritifera margaritifera*

Summary Conservation objectives:

Site Name: Lower River Suir SAC
Site Code: 0002137

- To restore the favourable conservation condition of Atlantic salt meadows
- To restore the favourable conservation condition of Mediterranean salt meadows
- (*Juncetalia maritimi*)
- To maintain the favourable conservation condition of Water courses of plain to montane
- levels with the *Ranunculion fluitantis* and Callitricho-Batrachion vegetation
- To maintain the favourable conservation condition of Hydrophilous tall herb fringe
- communities of plains and of the montane to alpine levels
- To restore the favourable conservation condition of Old sessile oak woods with Ilex and Blechnum in the British Isles
- To restore the favourable conservation condition of Alluvial forests with Alnus glutinosa
- and Fraxinus excelsior (Alno-Padion, *Alnion incanae*, *Salicion albae*)
- To restore the favourable conservation condition of *Taxus baccata* woods of the British
- Isles
- To restore the favourable conservation condition of Freshwater Pearl Mussel
- To maintain the favourable conservation condition of White-clawed Crayfish
- To restore the favourable conservation condition of Sea Lamprey
- To restore the favourable conservation condition of Brook Lamprey
- To restore the favourable conservation condition of River Lamprey
- To restore the favourable conservation condition of Twaite Shad
- To restore the favourable conservation condition of Atlantic Salmon
- To maintain the favourable conservation condition of Otter

Feature attributes and targets defining favourable conservation status:
https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002137.pdf

Closest distance (km) to the survey: 120km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
The survey will result in a small increase in vessel traffic (a single vessel), being present for one day during April-September 2020. With respect to potentially sensitive qualifying species (e.g. sea lamprey, river lamprey, twaite shad, Atlantic salmon and by association the freshwater pearl mussel) these are expected to cause no more than temporary and localised low-level behavioural responses similar to those from current normal Kinsale offshore operations and wider shipping activity in the Kinsale and Celtic Sea areas. However, given the migratory nature of some of the qualifying species, there is the potential for interaction with site qualifying interests, which are considered further in Section 4.2.1.

Underwater noise from vessel and survey activities
The primary contributor to underwater noise from the survey will be vessel activity and noise associated with the survey equipment. In view of the potential noise sensitivity of qualifying interests which have the potential to occur in or near the survey area (e.g. Atlantic salmon, sea lamprey), the potential for likely significant effect is considered further in Section 4.2.2.

Site Name: Slaney River Valley SAC
Site Code: 0000781

Site information

Relevant qualifying interests: Estuaries, freshwater pearl mussel *Margaritifera margaritifera*, Mudflats and sandflats not covered by seawater at low tide, sea lamprey *Petromyzon marinus*, brook lamprey *Lampetra planeri*, river lamprey *Lampetra fluviatilis*, twaite shad *Alosa fallax*, Atlantic salmon *Salmo salar*, otter *Lutra lutra*, *Phoca vitulina* (harbour seal), Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*), Mediterranean salt meadows (*Juncetalia maritimi*), water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation, old sessile oak woods with *Ilex* and *Blechnum* in the British Isles, alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)

Site Name: Slaney River Valley SAC
Site Code: 0000781

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: sea lamprey *Petromyzon marinus*, river lamprey *Lampetra fluviatilis*, twaite shad *Alosa fallax*, Atlantic salmon *Salmo salar*, freshwater pearl mussel *Margaritifera margaritifera*

Summary Conservation objectives:

- The status of the freshwater pearl mussel (*Margaritifera margaritifera*) as a qualifying Annex II
- species for the Slaney River Valley SAC is currently under review
- To restore the favourable conservation condition of Sea lamprey
- To restore the favourable conservation condition of Brook lamprey
- To restore the favourable conservation condition of River lamprey
- To restore the favourable conservation condition of Twaite shad
- To restore the favourable conservation condition of Salmon
- To maintain the favourable conservation condition of Estuaries
- To maintain the favourable conservation condition of Mudflats and sandflats not covered by
- seawater at low tide
- To restore the favourable conservation condition of Otter
- To maintain the favourable conservation condition of Harbour Seal
- To maintain the favourable conservation condition of Water courses of plain to montane levels with the *Ranunculion fluitantis* and Callitricho-Batrachion vegetation
- To restore the favourable conservation condition of old sessile oakwoods with Ilex and Blechnum
- To restore the favourable conservation condition of Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion)

Feature attributes and targets defining favourable conservation status:
https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000781.pdf

Closest distance (km) to the survey: 160km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
The survey will result in a small increase in vessel traffic (a single vessel), being present for one day during April-September 2020. With respect to potentially sensitive qualifying species (e.g. sea lamprey, river lamprey, twaite shad, Atlantic salmon and by association the freshwater pearl mussel) these are expected to cause no more than temporary and localised low-level behavioural responses similar to those from current normal Kinsale offshore operations and wider shipping activity in the Kinsale and Celtic Sea areas. However, given the migratory nature of some of the qualifying species, there is the potential for interaction with site qualifying interests, which are considered further in Section 4.2.1.

Underwater noise from vessel and survey activities
The primary contributor to underwater noise from the survey will be vessel activity and noise associated with the survey equipment. In view of the potential noise sensitivity of qualifying interests which have the potential to occur in or near the survey area (e.g. Atlantic salmon, sea lamprey), the potential for likely significant effect is considered further in Section 4.2.2.

Site Name: Bristol Channel Approaches / Dynesfeydd Môr Hafren SAC
Site Code: UK0030396

Site information

Relevant qualifying interests: *Phocoena phocoena*

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: harbour porpoise *Phocoena phocoena*

Site Name: Bristol Channel Approaches / Dynesfeydd Môr Hafren SAC
Site Code: UK0030396

Summary Conservation objectives:
To ensure that the integrity of the site is maintained and that it makes the best possible contribution to maintaining Favourable Conservation Status (FCS) for Harbour Porpoise in UK waters

In the context of natural change, this will be achieved by ensuring that:

- 1. The species is a viable component of the site.
- 2. There is no significant disturbance of the species.
- 3. The condition of supporting habitats and processes and prey availability are maintained.

Further supporting information on the site conservation objectives:
http://archive.jncc.gov.uk/pdf/BristolChApproaches_ConsAdvice.pdf

Closest distance (km) to the survey: 185km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
The survey will result in a small increase in vessel traffic within the wider Kinsale Area (a single vessel for one day in the period April to September 2019. With respect to potentially sensitive qualifying species (harbour porpoise) these are expected to cause no more than temporary and localised low-level behavioural responses similar to those from normal Kinsale offshore operations or shipping activity in the Kinsale and wider Celtic Sea areas. However, given the potential presence of these qualifying species the survey area there is the potential for interaction which is considered further in Section 4.2.1.

Underwater noise from vessel and survey activities
The primary contributor to underwater noise is from the use of survey equipment (one or more high-resolution geophysical survey (HRSG) sources). Given the potential presence of noise-sensitive qualifying species (harbour porpoise) in the survey area, the potential for likely significant effect is considered further in Section 4.2.2.

Site Name: North Anglesey Marine / Gogledd Môn Forol SAC
Site Code: UK0030398

Site information

Relevant qualifying interests: *Phocoena phocoena*

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: harbour porpoise *Phocoena phocoena*

Summary Conservation objectives:
To ensure that the integrity of the site is maintained and that it makes the best possible contribution to maintaining Favourable Conservation Status (FCS) for Harbour Porpoise in UK waters

In the context of natural change, this will be achieved by ensuring that:

- 1. The species is a viable component of the site.
- 2. There is no significant disturbance of the species.
- 3. The condition of supporting habitats and processes and prey availability are maintained.

Further supporting information on the site conservation objectives:
http://archive.jncc.gov.uk/pdf/NAnglesey_ConsAdvice.pdf

Closest distance (km) to the survey: 292km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
The survey will result in a small increase in vessel traffic within the wider Kinsale Area (a single vessel for one day in the period April to September 2019. With respect to potentially sensitive qualifying species (harbour porpoise) these are expected to cause no more than temporary and localised low-

Site Name: North Anglesey Marine / Gogledd Môn Forol SAC
Site Code: UK0030398

level behavioural responses similar to those from normal Kinsale offshore operations or shipping activity in the Kinsale and wider Celtic Sea areas. However, given the potential presence of these qualifying species the survey area there is the potential for interaction which is considered further in Section 4.2.1.

Underwater noise from vessel and survey activities
The primary contributor to underwater noise is from the use of survey equipment (one or more high-resolution geophysical survey (HRSG) sources). Given the potential presence of noise-sensitive qualifying species (harbour porpoise) in the survey area, the potential for likely significant effect is considered further in Section 4.2.2.

Site Name: West Wales Marine / Gorllewin Cymru Forol SAC
Site Code: UK0030397

Site information

Relevant qualifying interests: *Phocoena phocoena*

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: harbour porpoise *Phocoena phocoena*

Summary Conservation objectives:
To ensure that the integrity of the site is maintained and that it makes the best possible contribution to maintaining Favourable Conservation Status (FCS) for Harbour Porpoise in UK waters

In the context of natural change, this will be achieved by ensuring that:

- 1. The species is a viable component of the site.
- 2. There is no significant disturbance of the species.
- 3. The condition of supporting habitats and processes and prey availability are maintained.

Further supporting information on the site conservation objectives:
https://cdn.naturalresources.wales/media/681439/w-wales-marine-objectives-advice.pdf?mode=pad&rnd=131625760750000000

Closest distance (km) to the survey: 166km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
The survey will result in a small increase in vessel traffic within the wider Kinsale Area (a single vessel for one day in the period April to September 2019. With respect to potentially sensitive qualifying species (harbour porpoise) these are expected to cause no more than temporary and localised low-level behavioural responses similar to those from normal Kinsale offshore operations or shipping activity in the Kinsale and wider Celtic Sea areas. However, given the potential presence of these qualifying species the survey area there is the potential for interaction which is considered further in Section 4.2.1.

Underwater noise from vessel and survey activities
The primary contributor to underwater noise is from the use of survey equipment (one or more high-resolution geophysical survey (HRSG) sources). Given the potential presence of noise-sensitive qualifying species (harbour porpoise) in the survey area, the potential for likely significant effect is considered further in Section 4.2.2.

Site Name: North Channel SAC
Site Code: UK0030398

Site information

Relevant qualifying interests: *Phocoena phocoena*

Site Name: North Channel SAC
Site Code: UK0030398

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: harbour porpoise *Phocoena phocoena*

Summary Conservation objectives:
To ensure that the integrity of the site is maintained and that it makes the best possible contribution to maintaining Favourable Conservation Status (FCS) for Harbour Porpoise in UK waters

In the context of natural change, this will be achieved by ensuring that:

- 1. The species is a viable component of the site.
- 2. There is no significant disturbance of the species.
- 3. The condition of supporting habitats and processes and prey availability are maintained.

Further supporting information on the site conservation objectives:
http://archive.jncc.gov.uk/pdf/NorthChannel_ConsAdvice.pdf

Closest distance (km) to the survey: 372km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
The survey will result in a small increase in vessel traffic within the wider Kinsale Area (a single vessel for one day in the period April to September 2019. With respect to potentially sensitive qualifying species (harbour porpoise) these are expected to cause no more than temporary and localised low-level behavioural responses similar to those from normal Kinsale offshore operations or shipping activity in the Kinsale and wider Celtic Sea areas. However, given the potential presence of these qualifying species the survey area there is the potential for interaction which is considered further in Section 4.2.1.

Underwater noise from vessel and survey activities
The primary contributor to underwater noise is from the use of survey equipment (one or more high-resolution geophysical survey (HRSG) sources). Given the potential presence of noise-sensitive qualifying species (harbour porpoise) in the survey area, the potential for likely significant effect is considered further in Section 4.2.2.

Special Protection Areas (SPAs)

Site Name: Ballymacoda Bay SPA
Site Code: 0004023

Site information

Relevant qualifying interests: Wigeon (*Anas penelope*), teal (*Anas crecca*), ringed plover (*Charadrius hiaticula*), golden plover (*Pluvialis apricaria*), grey plover (*Pluvialis squatarola*), lapwing (*Vanellus vanellus*), sanderling (*Calidris alba*), dunlin (*Calidris alpina*), black-tailed godwit (*Limosa limo*sa), bar-tailed godwit (*Limosa lapponica*), curlew (*Numenius arquata*), redshank (*Tringa totanus*), turnstone (Arenaria interpres), black-headed gull (*Chroicocephalus ridibundus*), common gull (*Larus canus*), lesser black-backed gull (*Larus fuscus*), Wetland & Waterbirds

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: lesser black-backed gull (*Larus fuscus*)

Summary Conservation objectives:

- To maintain the favourable conservation condition of those qualifying interests listed above in Ballymacoda Bay SPA, including the wetland habitat as a resource for the regularly occurring migratory birds that utilise it.

Feature attributes and targets defining favourable conservation status:
https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004023.pdf

Site Name: Ballymacoda Bay SPA
Site Code: 0004023

Closest distance (km) to the survey: 59km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
As noted in Section 3.4, physical disturbance of seaduck and other waterbird flocks by vessel traffic is possible, but the distance from vessels at which flushing of birds could take place is significantly less than the minimum distance of the proposed survey (59km) such that there is no foreseeable interaction. Gull species, while having the potential to forage within range of the survey area (see Thaxter *et al.* 2012), are regarded to have a low sensitivity to shipping traffic (Garthe & Hüppop 2004, Fleissbach *et al.* 2019). There is either no potential for interaction in the case of waterbirds, or the qualifying interest which could interact is not sensitive to the proposed activities. However, in view of the potential for interaction, the latter is considered in Section 4.2.1.

Underwater noise from vessel and survey activities
None of the qualifying interests are diving seabirds which are likely to be most at risk of any underwater noise effects, and therefore no interactions with the survey are considered to be possible.

Site Name: Ballycotton Bay SPA
Site Code: 004022

Site information

Relevant qualifying interests: Teal (*Anas crecca*); ringed plover (*Charadrius hiaticula*); golden plover (*Pluvialis apricaria*); grey plover (*Pluvialis squatarola*); lapwing (*Vanellus vanellus*); black-tailed godwit (*Limosa limosa*); bar-tailed godwit (*Limosa lapponica*); curlew (*Numenius arquata*); turnstone (*Arenaria interpres*); common gull (*Larus canus*); lesser black-backed gull (*Larus fuscus*); Wetland & Waterbirds

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: lesser black-backed gull (*Larus fuscus*) – note this is a wintering feature of the site

Summary Conservation objectives:

- To maintain the favourable conservation condition of those qualifying interests listed above in Ballycotton Bay SPA, including the wetland habitat as a resource for the regularly occurring migratory birds that utilise it.

Feature attributes and targets defining favourable conservation status:
https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004022.pdf

Closest distance (km) to the survey: 52km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
As noted in Section 3.4, physical disturbance of seaduck and other waterbird flocks by vessel traffic is possible, but the distance from vessels at which flushing of birds could take place is significantly less than the minimum distance of the proposed survey (52km) such that there is no foreseeable interaction. Gull species, while having the potential to forage within range of the survey area (see Thaxter *et al.* 2012), are regarded to have a low sensitivity to shipping traffic (Garthe & Hüppop 2004, Fleissbach *et al.* 2019). It should also be noted that lesser black-backed gull is listed as a wintering feature for this site, lessening the potential for any interaction with the qualifying interest due to the proposed survey timing (April-September). There is either no potential for interaction in the case of waterbirds, or the qualifying interest which could interact is not sensitive to the proposed activities. However, in view of the potential for interaction, the latter is considered in Section 4.2.1.

Underwater noise from vessel and survey activities
None of the qualifying interests are diving seabirds which are likely to be most at risk of any underwater noise effects, and therefore no interactions with the survey are considered to be possible.

Site Name: Blackwater Estuary SPA
Site Code: 004028

Site information

Relevant qualifying interests: Wigeon (*Anas penelope*), golden plover (*Pluvialis apricaria*), lapwing (*Vanellus vanellus*), dunlin (*Calidris alpina*), black-tailed godwit (*Limosa limosa*), bar-tailed godwit (*Limosa lapponica*), curlew (*Numenius arquata*), redshank (*Tringa totanus*), Wetland & waterbirds

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: lesser black-backed gull (*Larus fuscus*)

Summary Conservation objectives:

- To maintain the favourable conservation condition of those qualifying interests listed above in Blackwater Estuary SPA, including the wetland habitat as a resource for the regularly occurring migratory birds that utilise it.

Feature attributes and targets defining favourable conservation status:
https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004028.pdf

Closest distance (km) to the survey: 66km

Consideration of site interest features against potential sources of likely significant effect

As noted in Section 3.4, physical disturbance of seaduck and other waterbird flocks by vessel traffic is possible, but the distance from vessels at which flushing of birds could take place is significantly less than the minimum distance of the proposed survey (66km) such that there is no foreseeable interaction. Gull species, while having the potential to forage within range of the survey area (see Thaxter *et al.* 2012), are regarded to have a low sensitivity to shipping traffic (Garthe & Hüppop 2004, Fleissbach *et al.* 2019). There is either no potential for interaction in the case of waterbirds, or the qualifying interest which could interact is not sensitive to the proposed activities. However, in view of the potential for interaction, the latter is considered in Section 4.2.1.

Underwater noise from vessel and survey activities
None of the qualifying interests are diving seabirds which are likely to be most at risk of any underwater noise effects, and therefore no interactions with the survey are considered to be possible.

Site Name: Cork Harbour SPA
Site Code: 004030

Site information

Relevant qualifying interests: Little grebe (*Tachybaptus ruficollis*), great crested grebe (*Podiceps cristatus*), cormorant (*Phalacrocorax carbo*), grey heron (*Ardea cinerea*), shelduck (*Tadorna tadorna*), wigeon (*Anas penelope*), teal (*Anas crecca*), pintail (*Anas acuta*), shoveler (*Anas clypeata*), red-breasted merganser (*Mergus serrator*), oystercatcher (*Haematopus ostralegus*), golden plover (*Pluvialis apricaria*), grey plover (*Pluvialis squatarola*), Lapwing (*Vanellus vanellus*), dunlin (*Calidris alpina*), Black-tailed Godwit (*Limosa limosa*), bar-tailed godwit (*Limosa lapponica*), curlew (*Numenius arquata*), redshank (*Tringa totanus*), black-headed gull (*Chroicocephalus ridibundus*), common gull (*Larus canus*), lesser black-backed gull (*Larus fuscus*), common tern (*Sterna hirundo*), Wetland & Waterbirds

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: lesser black-backed gull (*Larus fuscus*) – note this is a wintering feature of the site

Summary Conservation objectives:

- To maintain the favourable conservation condition of those qualifying interests listed above in Cork Harbour SPA, including the wetland habitat as a resource for the regularly occurring migratory birds that utilise it.

Feature attributes and targets defining favourable conservation status:

Site Name: Cork Harbour SPA
Site Code: 004030

https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004030.pdf

Closest distance (km) to the survey: 52km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
As noted in Section 3.4, physical disturbance of seaduck and other waterbird flocks by vessel traffic is possible, but the distance from vessels at which flushing of birds could take place is significantly less than the minimum distance of the proposed survey (52km) such that there is no foreseeable interaction. Gull species, while having the potential to forage within range of the survey area (see Thaxter *et al.* 2012), are regarded to have a low sensitivity to shipping traffic (Garthe & Hüppop 2004, Fleissbach *et al.* 2019). It should also be noted that this species is listed as a wintering feature, lessening the potential for any interaction with the qualifying interest due to the proposed survey timing. There is either no potential for interaction in the case of waterbirds, or the qualifying interest which could interact is not sensitive to the proposed activities. However, in view of the potential for interaction, the latter is considered in Section 4.2.1.

Underwater noise from vessel and survey activities
None of the qualifying interests are diving seabirds which are likely to be most at risk of any underwater noise effects, and therefore no interactions with the survey are considered to be possible.

Site Name: Dungarvan Harbour SPA
Site Code: 004032

Site information

Relevant qualifying interests: Great crested grebe (*Podiceps cristatus*), light-bellied brent goose (*Branta bernicla hrota*), shelduck (*Tadorna tadorna*), red-breasted merganser (*Mergus serrator*), oystercatcher (*Haematopus ostralegus*), golden plover (*Pluvialis apricaria*), grey plover (*Pluvialis squatarola*), lapwing (*Vanellus vanellus*), knot (*Calidris canutus*), dunlin (*Calidris alpina*), black-tailed godwit (*Limosa limosa*), bar-tailed godwit (*Limosa lapponica*), curlew (*Numenius arquata*), redshank (*Tringa totanus*), turnstone (*Arenaria interpres*), Wetland & Waterbirds

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: lesser black-backed gull (*Larus fuscus*)

Summary Conservation objectives:

- To maintain the favourable conservation condition of those qualifying interests listed above in Dungarvan Harbour SPA, including the wetland habitat as a resource for the regularly occurring migratory birds that utilise it.

Feature attributes and targets defining favourable conservation status:
https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004032.pdf

Closest distance (km) to the survey: 80km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
As noted in Section 3.4, physical disturbance of seaduck and other waterbird flocks by vessel traffic is possible, but the distance from vessels at which flushing of birds could take place is significantly less than the minimum distance of the proposed survey (80km) such that there is no foreseeable interaction. Gull species, while having the potential to forage within range of the survey area (see Thaxter *et al.* 2012), are regarded to have a low sensitivity to shipping traffic (Garthe & Hüppop 2004, Fleissbach *et al.* 2019). There is either no potential for interaction in the case of waterbirds, or the qualifying interest which could interact is not sensitive to the proposed activities. However, in view of the potential for interaction, the latter is considered in Section 4.2.1.

Underwater noise from vessel and survey activities
None of the qualifying interests are diving seabirds which are likely to be most at risk of any underwater noise effects, and therefore no interactions with the survey are considered to be possible.

Site Name: Galley Head to Duneen Point SPA
Site Code: 004190

Site information

Relevant qualifying interests: Chough (*Pyrrhocorax pyrrhocorax*), northern fulmar (*Fulmarus glacialis*), herring gull (*Larus argentatus*)

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: northern fulmar (*Fulmarus glacialis*)

Summary Conservation objectives:

- To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA (above).

Feature attributes and targets defining favourable conservation status:
Not listed - https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004190.pdf

Closest distance (km) to the survey: 69km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
Fulmar, while having the potential to forage within range of the survey area (see Thaxter *et al.* 2012), are regarded to have a low sensitivity to shipping traffic (Garthe & Hüppop 2004, Fleissbach *et al.* 2019). However, in view of the potential for interaction, this is considered further in Section 4.2.1.

Underwater noise from vessel and survey activities
None of the qualifying interests are diving seabirds which are likely to be most at risk of any underwater noise effects, and therefore no interactions with the survey are considered to be possible.

Site Name: Helvick Head to Ballyquin SPA
Site Code: 004192

Site information

Relevant qualifying interests: Cormorant (*Phalacrocorax carbo*), peregrine (*Falco peregrinus*), herring gull (*Larus argentatus*), kittiwake (*Rissa tridactyla),* chough (*Pyrrhocorax pyrrhocorax*), northern fulmar (*Fulmarus glacialis*), great black-backed gull (*larus marinus*), shag (*Phalacrocorax aristotelis),* guillemot (*Uria aalge*), razorbill (*alca torda*)

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: northern fulmar (*Fulmarus glacialis*), guillemot (*Uria aalge*)

Summary Conservation objectives:

- To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA (above)

Feature attributes and targets defining favourable conservation status:
Not listed - https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004192.pdf

Closest distance (km) to the survey: 70km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
While fulmar and common guillemot have the potential to forage within range of the survey area (see Thaxter *et al.* 2012), neither are regarded to have a high sensitivity to shipping traffic (Garthe & Hüppop 2004, Fleissbach *et al.* 2019). However, in view of the potential for interaction, this is considered further in Section 4.2.1.

Underwater noise from vessel and survey activities

Site Name: Helvick Head to Ballyquin SPA
Site Code: 004192

There is the potential for interactions between a diving seabird species (guillemot) which is potentially sensitive to underwater noise, and the survey activities, which is considered further in Section 4.2.

Site Name: Old Head of Kinsale SPA
Site Code: 004021

Site information

Relevant qualifying interests: Kittiwake (*Rissa tridactyla*), guillemot (*Uria aalge*), shag (*Phalacrocorax aristotelis),* northern fulmar (*Fulmarus glacialis*), herring gull (*Larus argentatus*), razorbill (*alca torda*)

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: northern fulmar (*Fulmarus glacialis*), guillemot (*Uria aalge*), herring gull (*Larus argentatus*), razorbill (*alca torda*)

Summary Conservation objectives:

- To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA (above)

Feature attributes and targets defining favourable conservation status:
Not listed - https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004021.pdf

Closest distance (km) to the survey: 50km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
Fulmar, herring gull, common guillemot and razorbill have the potential to forage within range of the survey area (see Thaxter *et al.* 2012), and are of low to moderate sensitivity to shipping traffic (Garthe & Hüppop 2004, Fleissbach *et al.* 2019). In view of the potential for interaction, this is considered further in Section 4.2.1.

Underwater noise from vessel and survey activities
There is the potential for interactions between diving seabird species (guillemot, razorbill) which are potentially sensitive to underwater noise, and the survey activities. This is considered further in Section 4.2.2.

Site Name: Seven Heads SPA
Site Code: 004191

Site information

Relevant qualifying interests: Chough (*Pyrrhocorax pyrrhocorax*), herring gull (*Larus argentatus*), peregrine (*Falco peregrinus*), cormorant (*Phalacrocorax carbo*)

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: herring gull (*Larus argentatus*)

Summary Conservation objectives:

- To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA (above)

Feature attributes and targets defining favourable conservation status:
Not listed - https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004191.pdf

Closest distance (km) to the survey: 58km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel

Site Name: Seven Heads SPA
Site Code: 004191

Herring gull has the potential to forage within range of the survey area (see Thaxter *et al.* 2012) but has a low to sensitivity to shipping traffic (Garthe & Hüppop 2004, Fleissbach *et al.* 2019). In view of the potential for interaction, this is considered further in Section 4.2.1.

Underwater noise from vessel and survey activities
Herring gull is not a diving seabird likely to be most at risk of any underwater noise effects, and therefore no interactions with the survey are considered to be possible.

Site Name: Sheep's Head to Toe Head SPA
Site Code: 004156

Site information

Relevant qualifying interests: Chough (*Pyrrhocorax pyrrhocorax*), herring gull (*Larus argentatus*), peregrine (*Falco peregrinus*), shag (*Phalacrocorax aristotelis),* northern fulmar (*Fulmarus glacialis*)

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: northern fulmar (*Fulmarus glacialis*)

Summary Conservation objectives:

- To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA (above)

Feature attributes and targets defining favourable conservation status:
Not listed - https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004156.pdf

Closest distance (km) to the survey: 89km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
Fulmar, while having the potential to forage within range of the survey area (see Thaxter *et al.* 2012), are regarded to have a low sensitivity to shipping traffic (Garthe & Hüppop 2004, Fleissbach *et al.* 2019). However, in view of the potential for interaction, this is considered further in Section 4.2.1.

Underwater noise from vessel and survey activities
None of the qualifying interests are diving seabirds which are likely to be most at risk of any underwater noise effects, and therefore no interactions with the survey are considered to be possible.

Site Name: Saltee Islands SPA
Site Code: 004002

Site information

Relevant qualifying interests: Razorbill (*Alca torda*), peregrine (*Falco peregrinus*), Atlantic puffin (*Fratercula arctica*), northern fulmar (*Fulmarus glacialis*), lesser black-backed gull (*Larus fuscus*), cormorant (*Phalacrocorax carbo*), Manx shearwater (*Puffinus puffinus*), red-billed chough (*Pyrrhocorax pyrrhocorax*), black-legged kittiwake (*Rissa tridactyla*), northern gannet (*Morus bassanus*), guillemot (*Uria aalge*)

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: northern fulmar (*Fulmarus glacialis*), lesser black-backed gull (*Larus fuscus*), Manx shearwater (*Puffinus puffinus*), northern gannet (*Morus bassanus*)

Summary Conservation objectives:

- To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA (above)

Feature attributes and targets defining favourable conservation status:
Not listed - https://www.npws.ie/sites/default/files/protected-

Site Name: Saltee Islands SPA
Site Code: 004002

sites/conservation_objectives/CO004002.pdf

Closest distance (km) to the survey: 123km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
Fulmar, lesser black-backed gull, Manx shearwater and northern gannet have the potential to forage within range of the survey area (see Thaxter *et al.* 2012). Sensitivity to vessel movements is considered to be low for those species (see Garthe & Hüppop 2004, MMO 2018, Fleissbach *et al.* 2019), but in view of the potential for interaction, this is considered further in Section 4.2.1.

Underwater noise from vessel and survey activities
There is the potential for interactions between diving seabird species (Manx shearwater, northern gannet) which are potentially sensitive to underwater noise, and the survey activities. This is considered further in Section 4.2.2.

Site Name: Puffin Island SPA
Site Code: 004003

Site information

Relevant qualifying interests: Razorbill (*Alca torda*), Atlantic puffin (*Fratercula arctica*), northern fulmar (*Fulmarus glacialis*), European storm-petrel (*Hydrobates pelagicus*), herring gull (*Larus argentatus*), lesser black-backed gull (*Larus fuscus*), Manx shearwater (*Puffinus puffinus*), red-billed chough (*Pyrrhocorax pyrrhocorax*), black-legged kittiwake (*Rissa tridactyla*), guillemot (*Uria aalge*)

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: northern fulmar (*Fulmarus glacialis*), Manx shearwater (*Puffinus puffinus*)

Summary Conservation objectives:

- To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA (above)

Feature attributes and targets defining favourable conservation status:
Not listed - https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004003.pdf

Closest distance (km) to the survey: 178km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
Fulmar and Manx shearwater have the potential to forage within range of the survey area (see Thaxter *et al.* 2012). Sensitivity to vessel movements is considered to be low for those species (see Garthe & Hüppop 2004, MMO 2018, Fleissbach *et al.* 2019), but in view of the potential for interaction, this is considered further in Section 4.2.1.

Underwater noise from vessel and survey activities
There is the potential for interactions between diving seabird species (Manx shearwater) which are potentially sensitive to underwater noise, and the survey activities. This is considered further in Section 4.2.2.

Site Name: Cliffs of Moher SPA
Site Code: 004005

Site information

Relevant qualifying interests: razorbill (*Alca torda*), peregrine falcon (*Falco peregrinus*), Atlantic puffin (*Fratercula arctica*), northern fulmar (*Fulmarus glacialis*), red-billed chough (*Pyrrhocorax pyrrhocorax*), black-legged kittiwake (*Rissa tridactyla*), common guillemot (*Uria aalge*)

Site Name: Cliffs of Moher SPA
Site Code: 004005

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: northern fulmar (*Fulmarus glacialis*)

Summary Conservation objectives:

- To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA (above)

Feature attributes and targets defining favourable conservation status:
Not listed - https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004005.pdf

Closest distance (km) to the survey: 339km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
Fulmar, while having the potential to forage within range of the survey area (see Thaxter *et al.* 2012), are regarded to have a low sensitivity to shipping traffic (Garthe & Hüppop 2004, Fleissbach *et al.* 2019). However, in view of the potential for interaction, this is considered further in Section 4.2.1.

Underwater noise from vessel and survey activities
None of the qualifying interests are diving seabirds which are likely to be most at risk of any underwater noise effects, and therefore no interactions with the survey are considered to be possible.

Site Name: Skelligs SPA
Site Code: 004007

Site information

Relevant qualifying interests: razorbill (*Alca torda*), peregrine falcon (*Falco peregrinus*), Atlantic puffin (*Fratercula arctica*), northern fulmar (*Fulmarus glacialis*), European storm-petrel (*Hydrobates pelagicus*), Manx shearwater (*Puffinus puffinus*), red-billed chough (*Pyrrhocorax pyrrhocorax*), black-legged kittiwake (*Rissa tridactyla*), northern gannet (*Morus bassanus*), common guillemot (*Uria aalge*)

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: northern fulmar (*Fulmarus glacialis*), northern gannet (*Morus bassanus*), Manx shearwater (*Puffinus puffinus*)

Summary Conservation objectives:

- To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA (above)

Feature attributes and targets defining favourable conservation status:
Not listed - https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004007.pdf

Closest distance (km) to the survey: 183km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
Fulmar, Manx shearwater and northern gannet have the potential to forage within range of the survey area (see Thaxter *et al.* 2012). Sensitivity to vessel movements is considered to be low for those species (see Garthe & Hüppop 2004, MMO 2018, Fleissbach *et al.* 2019), but in view of the potential for interaction, this is considered further in Section 4.2.1.

Underwater noise from vessel and survey activities
There is the potential for interactions between diving seabird species (Manx shearwater, northern gannet) which are potentially sensitive to underwater noise, and the survey activities. This is considered further in Section 4.2.2.

Site Name: Blasket Islands SPA
Site Code: 004008

Site information

Relevant qualifying interests: razorbill (*Alca torda*), peregrine falcon (*Falco peregrinus*), Atlantic puffin (*Fratercula arctica*), northern fulmar (*Fulmarus glacialis*), European storm-petrel (*Hydrobates pelagicus*), common gull (*Larus canus*), lesser black-backed gull (*Larus fuscus*), leach's storm-petrel (Oceanodroma leucorhoa), Manx shearwater (*Puffinus puffinus*), red-billed chough (*Pyrrhocorax pyrrhocorax*), black-legged kittiwake (*Rissa tridactyla*), Arctic tern (*Sterna paradisaea*), guillemot (*Uria aalge*)

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: northern fulmar (*Fulmarus glacialis*), Manx shearwater (*Puffinus puffinus*)

Summary Conservation objectives:

- To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA (above)

Feature attributes and targets defining favourable conservation status:
Not listed - https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004008.pdf

Closest distance (km) to the survey: 216km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
Fulmar and Manx shearwater have the potential to forage within range of the survey area (see Thaxter *et al.* 2012). Sensitivity to vessel movements is considered to be low for those species (see Garthe & Hüppop 2004, MMO 2018, Fleissbach *et al.* 2019), but in view of the potential for interaction, this is considered further in Section 4.2.1.

Underwater noise from vessel and survey activities
There is the potential for interactions between diving seabird species (Manx shearwater) which are potentially sensitive to underwater noise, and the survey activities. This is considered further in Section 4.2.2.

Site Name: The Bull and The Cow Rocks SPA
Site Code: 004066

Site information

Relevant qualifying interests: razorbill (*Alca torda*), Atlantic puffin (*Fratercula arctica*), northern fulmar (*Fulmarus glacialis*), European storm-petrel (*Hydrobates pelagicus*), herring gull (*Larus argentatus*), cormorant (*Phalacrocorax carbo carbo*), black-legged kittiwake (*Rissa tridactyla*), northern gannet (*Morus bassanus*), guillemot (*Uria aalge*)

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: northern fulmar (*Fulmarus glacialis*), northern gannet (*Morus bassanus*)

Summary Conservation objectives:

- To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA (above)

Feature attributes and targets defining favourable conservation status:
Not listed - https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004066.pdf

Site Name: The Bull and The Cow Rocks SPA
Site Code: 004066

Closest distance (km) to the survey: 163km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
Fulmar and northern gannet have the potential to forage within range of the survey area (see Thaxter *et al.* 2012). Sensitivity to vessel movements is considered to be low for those species (see Garthe & Hüppop 2004, MMO 2018, Fleissbach *et al.* 2019), but in view of the potential for interaction, this is considered further in Section 4.2.1.

Underwater noise from vessel and survey activities
There is the potential for interactions between diving seabird species (northern gannet) which are potentially sensitive to underwater noise, and the survey activities. This is considered further in Section 4.2.2.

Site Name: Lambey Island SPA
Site Code: 004069

Site information

Relevant qualifying interests: razorbill (*Alca torda*), greylag goose (Anser anser), ruddy turnstone (Arenaria interpres), brent goose (*Branta bernicla*), purple sandpiper (*Calidris maritima*), peregrine falcon (*Falco peregrinus*), Atlantic puffin (*Fratercula arctica*), northern fulmar (*Fulmarus glacialis*), Eurasian oystercatcher (Haematopus ostralegus), lesser black-backed gull (*Larus fuscus*), Eurasian curlew (*Numenius arquata*), cormorant (*Phalacrocorax carbo carbo*), Manx shearwater (*Puffinus puffinus*), black-legged kittiwake (*Rissa tridactyla*), common shelduck (*Tadorna tadorna*), guillemot (*Uria aalge*)

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: northern fulmar (*Fulmarus glacialis*), Manx shearwater (*Puffinus puffinus*)

Summary Conservation objectives:

- To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA (above)

Feature attributes and targets defining favourable conservation status:
Not listed - https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004069.pdf

Closest distance (km) to the survey: 269km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
Fulmar and Manx shearwater have the potential to forage within range of the survey area (see Thaxter *et al.* 2012). Sensitivity to vessel movements is considered to be low for those species (see Garthe & Hüppop 2004, MMO 2018, Fleissbach *et al.* 2019), but in view of the potential for interaction, this is considered further in Section 4.2.1.

Underwater noise from vessel and survey activities
There is the potential for interactions between diving seabird species (Manx shearwater) which are potentially sensitive to underwater noise, and the survey activities. This is considered further in Section 4.2.2.

Site Name: Tacumshin Lake SPA
Site Code: 004092

Site information

Relevant qualifying interests: reed warbler (*Acrocephalus scirpaceus*), northern pintail (*Anas acuta*), northern shoveler (*Anas clypeata*), Eurasian teal (*Anas crecca*), Eurasian wigeon (*Anas*

Site Name: Tacumshin Lake SPA
Site Code: 004092

penelope), mallard (*Anas platyrhynchos*), garganey (*Anas querquedula*), gadwall (*Anas strepera*), greenland white-fronted goose (*Anser albifrons flavirostris*), common pochard (*Aythya ferina*), tufted duck (*Aythya fuligula*), brent goose (*Branta bernicla*), dunlin (*Calidris alpina*), curlew sandpiper (*Calidris ferruginea*), little stint (*Calidris minuta*), Eurasian marsh harrier (*Circus aeruginosus*), tundra swan (*Cygnus columbianus bewickii*), whooper swan (*Cygnus cygnus*), common coot (*Fulica atra*), lesser black-backed gull (*Larus fuscus*), black-headed gull (*Larus ridibundus*), black-tailed godwit (*Limosa limosa*), Eurasian curlew (*Numenius arquata*), ruff (*Philomachus pugnax*), European golden plover (*Pluvialis apricaria*), grey plover (*Pluvialis squatarola*), common shelduck (*Tadorna tadorna*), spotted redshank (*Tringa erythropus*), wood sandpiper (*Tringa glareola*), common greenshank (*Tringa nebularia*), green sandpiper (*Tringa ochropus*), common redshank (*Tringa totanus*), northern lapwing (*Vanellus vanellus*)

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: lesser black-backed gull (*Larus fuscus*) – note this is a wintering feature of the site

Summary Conservation objectives:

- To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA (above)

Feature attributes and targets defining favourable conservation status:
Not listed - https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004069.pdf

Closest distance (km) to the survey: 136km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
As noted in Section 3.4, physical disturbance of seaduck and other waterbird flocks by vessel traffic is possible, but the distance from vessels at which flushing of birds could take place is significantly less than the minimum distance of the proposed survey (136km) such that there is no foreseeable interaction. Gull species, while having the potential to forage within range of the survey area (see Thaxter *et al.* 2012), are regarded to have a low sensitivity to shipping traffic (Garthe & Hüppop 2004, Fleissbach *et al.* 2019). It should also be noted that this species is listed as a wintering feature, lessening the potential for any interaction with the qualifying interest due to the proposed survey timing. There is either no potential for interaction in the case of waterbirds, or the qualifying interest which could interact is not sensitive to the proposed activities. However, in view of the potential for interaction, the latter is considered in Section 4.2.1.

Underwater noise from vessel and survey activities
None of the qualifying interests are diving seabirds which are likely to be most at risk of any underwater noise effects, and therefore no interactions with the survey are considered to be possible.

Site Name: Kilcolman Bog SPA
Site Code: 004095

Site information

Relevant qualifying interests: northern pintail (*Anas acuta*), northern shoveler (*Anas clypeata*), Eurasian teal (*Anas crecca*), Eurasian wigeon (*Anas penelope*), mallard (*Anas platyrhynchos*), common pochard (*Aythya ferina*), tufted duck (*Aythya fuligula*), whooper swan (*Cygnus cygnus*), common coot (*Fulica atra*), lesser black-backed gull (*Larus fuscus*), black-headed gull (*Larus ridibundus*), European golden plover (*Pluvialis apricaria*), northern lapwing (*Vanellus vanellus*); Wetland and Waterbirds

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: lesser black-backed gull (*Larus fuscus*) – note this is a wintering feature of the site

Site Name: Kilcolman Bog SPA
Site Code: 004095

Summary Conservation objectives:

- To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA (above)
- To maintain or restore the favourable conservation condition of the wetland habitat at Kilcolman Bog SPA as a resource for the regularly-occurring migratory waterbirds that utilise it.

Feature attributes and targets defining favourable conservation status:
Not listed - https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004095.pdf

Closest distance (km) to the survey: 108km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
As noted in Section 3.4, physical disturbance of seaduck and other waterbird flocks by vessel traffic is possible, but the distance from vessels at which flushing of birds could take place is significantly less than the minimum distance of the proposed survey (52km) such that there is no foreseeable interaction. Gull species, while having the potential to forage within range of the survey area (see Thaxter *et al.* 2012), are regarded to have a low sensitivity to shipping traffic (Garthe & Hüppop 2004, Fleissbach *et al.* 2019). It should also be noted that lesser black-backed gull is listed as a wintering feature for this site, lessening the potential for any interaction with the qualifying interest due to the proposed survey timing (April-September). There is either no potential for interaction in the case of waterbirds, or the qualifying interest which could interact is not sensitive to the proposed activities. However, in view of the potential for interaction, the latter is considered in Section 4.2.1.

Underwater noise from vessel and survey activities
None of the qualifying interests are diving seabirds which are likely to be most at risk of any underwater noise effects, and therefore no interactions with the survey are considered to be possible.

Site Name: Howth Head Coast SPA
Site Code: 004113

Site information

Relevant qualifying interests: razorbill (*Alca torda*), peregrine (*Falco peregrinus*), northern fulmar (*Fulmarus glacialis*), black-legged kittiwake (*Rissa tridactyla*), common guillemot (*Uria aalge*)

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: northern fulmar (*Fulmarus glacialis*)

Summary Conservation objectives:

- To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA (above)

Feature attributes and targets defining favourable conservation status:
Not listed - https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004113.pdf

Closest distance (km) to the survey:257km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
Fulmar, while having the potential to forage within range of the survey area (see Thaxter *et al.* 2012), are regarded to have a low sensitivity to shipping traffic (Garthe & Hüppop 2004, Fleissbach *et al.* 2019). However, in view of the potential for interaction, this is considered further in Section 4.2.1.

Underwater noise from vessel and survey activities
None of the qualifying interests are diving seabirds which are likely to be most at risk of any underwater noise effects, and therefore no interactions with the survey are considered to be possible.

Site Name: Illaunonearaun SPA
Site Code: 004114

Site information

Relevant qualifying interests: Barnacle goose (*Branta leucopsis*), northern fulmar (*Fulmarus glacialis*), herring gull (*Larus argentatus*), lesser black-backed gull (*Larus fuscus*), cormorant (*Phalacrocorax carbo carbo*)

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: northern fulmar (*Fulmarus glacialis*)

Summary Conservation objectives:

- To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA (above)

Feature attributes and targets defining favourable conservation status:
Not listed - https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004114.pdf

Closest distance (km) to the survey: 304km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
Fulmar, while having the potential to forage within range of the survey area (see Thaxter *et al.* 2012), are regarded to have a low sensitivity to shipping traffic (Garthe & Hüppop 2004, Fleissbach *et al.* 2019). However, in view of the potential for interaction, this is considered further in Section 4.2.1.

Underwater noise from vessel and survey activities
None of the qualifying interests are diving seabirds which are likely to be most at risk of any underwater noise effects, and therefore no interactions with the survey are considered to be possible.

Site Name: Loop Head SPA
Site Code: 004119

Site information

Relevant qualifying interests: Razorbill (*Alca torda*), peregrine (*Falco peregrinus*), northern fulmar (*Fulmarus glacialis*), red-billed chough (*Pyrrhocorax pyrrhocorax*), black-legged kittiwake (*Rissa tridactyla*), common guillemot (*Uria aalge*)

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: northern fulmar (*Fulmarus glacialis*)

Summary Conservation objectives:

- To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA (above)

Feature attributes and targets defining favourable conservation status:
Not listed - https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004119.pdf

Closest distance (km) to the survey: 287km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
Fulmar, while having the potential to forage within range of the survey area (see Thaxter *et al.* 2012), are regarded to have a low sensitivity to shipping traffic (Garthe & Hüppop 2004, Fleissbach *et al.* 2019). However, in view of the potential for interaction, this is considered further in Section 4.2.1.

Underwater noise from vessel and survey activities
None of the qualifying interests are diving seabirds which are likely to be most at risk of any

Site Name: Loop Head SPA **Site Code: 004119**
underwater noise effects, and therefore no interactions with the survey are considered to be possible.

Site Name: Ireland's Eye SPA **Site Code: 004117**
Site information
Relevant qualifying interests: razorbill (*Alca torda*), peregrine (*Falco peregrinus*), Atlantic puffin (*Fratercula arctica*), northern fulmar (*Fulmarus glacialis*), cormorant (*Phalacrocorax carbo carbo*), black-legged kittiwake (*Rissa tridactyla*), northern gannet (*Morus bassanus*), common guillemot (*Uria aalge*) **Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area:** northern fulmar (*Fulmarus glacialis*) **Summary Conservation objectives:** • To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA (above) **Feature attributes and targets defining favourable conservation status:** Not listed - https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004117.pdf
Closest distance (km) to the survey: 260km
Consideration of site interest features against potential sources of likely significant effect
The physical presence of survey vessel Fulmar, while having the potential to forage within range of the survey area (see Thaxter *et al.* 2012), are regarded to have a low sensitivity to shipping traffic (Garthe & Hüppop 2004, Fleissbach *et al.* 2019). However, in view of the potential for interaction, this is considered further in Section 4.2.1. **Underwater noise from vessel and survey activities** None of the qualifying interests are diving seabirds which are likely to be most at risk of any underwater noise effects, and therefore no interactions with the survey are considered to be possible.

Site Name: Skerries Islands SPA **Site Code: 004122**
Site information
Relevant qualifying interests: Eurasian wigeon (*Anas penelope*), mallard (*Anas platyrhynchos*), ruddy turnstone (Arenaria interpres), short-eared owl (*Asio flammeus*), brent goose (*Branta bernicla*), purple sandpiper (*Calidris maritima*), ringed plover (*Charadrius hiaticula*), northern fulmar (*Fulmarus glacialis*), common snipe (Gallinago gallinago), Eurasian oystercatcher (Haematopus ostralegus), Eurasian curlew (*Numenius arquata*), cormorant (*Phalacrocorax carbo carbo*), European golden plover (*Pluvialis apricaria*), grey plover (*Pluvialis squatarola*), northern lapwing (*Vanellus vanellus*) **Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area:** northern fulmar (*Fulmarus glacialis*) **Summary Conservation objectives:** • To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA (above) **Feature attributes and targets defining favourable conservation status:** Not listed - https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004122.pdf

Site Name: Skerries Islands SPA
Site Code: 004122

Closest distance (km) to the survey: 276km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
Fulmar, while having the potential to forage within range of the survey area (see Thaxter *et al.* 2012), are regarded to have a low sensitivity to shipping traffic (Garthe & Hüppop 2004, Fleissbach *et al.* 2019). However, in view of the potential for interaction, this is considered further in Section 4.2.1.

Underwater noise from vessel and survey activities
None of the qualifying interests are diving seabirds which are likely to be most at risk of any underwater noise effects, and therefore no interactions with the survey are considered to be possible.

Site Name: Magharee Islands SPA
Site Code: 004125

Site information

Relevant qualifying interests: Barnacle goose (*Branta leucopsis*), northern fulmar (*Fulmarus glacialis*), common gull (*Larus canus*), lesser black-backed gull (*Larus fuscus*), cormorant (*Phalacrocorax carbo carbo*), red-billed chough (*Pyrrhocorax pyrrhocorax*), little tern (*Sterna albifrons*), common tern (*Sterna hirundo*), Arctic tern (*Sterna paradisaea*)

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: northern fulmar (*Fulmarus glacialis*)

Summary Conservation objectives:

- To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA (above)

Feature attributes and targets defining favourable conservation status:
Not listed - https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004125.pdf

Closest distance (km) to the survey: 263km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
Fulmar, while having the potential to forage within range of the survey area (see Thaxter *et al.* 2012), are regarded to have a low sensitivity to shipping traffic (Garthe & Hüppop 2004, Fleissbach *et al.* 2019). However, in view of the potential for interaction, this is considered further in Section 4.2.1.

Underwater noise from vessel and survey activities
None of the qualifying interests are diving seabirds which are likely to be most at risk of any underwater noise effects, and therefore no interactions with the survey are considered to be possible.

Site Name: Wicklow Head SPA
Site Code: 004127

Site information

Relevant qualifying interests: Razorbill (*Alca torda*), peregrine falcon (*Falco peregrinus*), northern fulmar (*Fulmarus glacialis*), black-legged kittiwake (*Rissa tridactyla*), common whitethroat (*Sylvia communis*), common guillemot (*Uria aalge*)

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: northern fulmar (*Fulmarus glacialis*)

Summary Conservation objectives:

- To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA (above)

Site Name: Wicklow Head SPA
Site Code: 004127

Feature attributes and targets defining favourable conservation status:
Not listed - https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004127.pdf

Closest distance (km) to the survey: 221km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
Fulmar, while having the potential to forage within range of the survey area (see Thaxter *et al.* 2012), are regarded to have a low sensitivity to shipping traffic (Garthe & Hüppop 2004, Fleissbach *et al.* 2019). However, in view of the potential for interaction, this is considered further in Section 4.2.1.

Underwater noise from vessel and survey activities
None of the qualifying interests are diving seabirds which are likely to be most at risk of any underwater noise effects, and therefore no interactions with the survey are considered to be possible.

Site Name: Dingle Peninsula SPA
Site Code: 004153

Site information

Relevant qualifying interests: Peregrine (*Falco peregrinus*), northern fulmar (*Fulmarus glacialis*), red-billed chough (*Pyrrhocorax pyrrhocorax*)

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: northern fulmar (*Fulmarus glacialis*)

Summary Conservation objectives:

- To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA (above)

Feature attributes and targets defining favourable conservation status:
Not listed - https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004153.pdf

Closest distance (km) to the survey: 219km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
Fulmar, while having the potential to forage within range of the survey area (see Thaxter *et al.* 2012), are regarded to have a low sensitivity to shipping traffic (Garthe & Hüppop 2004, Fleissbach *et al.* 2019). However, in view of the potential for interaction, this is considered further in Section 4.2.1.

Underwater noise from vessel and survey activities
None of the qualifying interests are diving seabirds which are likely to be most at risk of any underwater noise effects, and therefore no interactions with the survey are considered to be possible.

Site Name: Iveragh Peninsula SPA
Site Code: 004154

Site information

Relevant qualifying interests: Razorbill (*Alca torda*), peregrine falcon (*Falco peregrinus*), northern fulmar (*Fulmarus glacialis*), herring gull (*Larus argentatus*), European shag (*Phalacrocorax aristotelis*), cormorant (*Phalacrocorax carbo carbo*), red-billed chough (*Pyrrhocorax pyrrhocorax*), black-legged kittiwake (*Rissa tridactyla*), common guillemot (*Uria aalge*)

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: northern fulmar (*Fulmarus glacialis*)

Site Name: Iveragh Peninsula SPA
Site Code: 004154

Summary Conservation objectives:

- To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA (above)

Feature attributes and targets defining favourable conservation status:
Not listed - https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004154.pdf

Closest distance (km) to the survey: 182km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
Fulmar, while having the potential to forage within range of the survey area (see Thaxter *et al.* 2012), are regarded to have a low sensitivity to shipping traffic (Garthe & Hüppop 2004, Fleissbach *et al.* 2019). However, in view of the potential for interaction, this is considered further in Section 4.2.1.

Underwater noise from vessel and survey activities
None of the qualifying interests are diving seabirds which are likely to be most at risk of any underwater noise effects, and therefore no interactions with the survey are considered to be possible.

Site Name: Beara Peninsula SPA
Site Code: 004155

Site information

Relevant qualifying interests: Peregrine falcon (*Falco peregrinus*), northern fulmar (*Fulmarus glacialis*), herring gull (*Larus argentatus*), European shag (*Phalacrocorax aristotelis*), red-billed chough (*Pyrrhocorax pyrrhocorax*)

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: northern fulmar (*Fulmarus glacialis*)

Summary Conservation objectives:

- To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA (above)

Feature attributes and targets defining favourable conservation status:
Not listed - https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004155.pdf

Closest distance (km) to the survey: 134km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
Fulmar, while having the potential to forage within range of the survey area (see Thaxter *et al.* 2012), are regarded to have a low sensitivity to shipping traffic (Garthe & Hüppop 2004, Fleissbach *et al.* 2019). However, in view of the potential for interaction, this is considered further in Section 4.2.1.

Underwater noise from vessel and survey activities
None of the qualifying interests are diving seabirds which are likely to be most at risk of any underwater noise effects, and therefore no interactions with the survey are considered to be possible.

Site Name: Deenish Island and Scariff Island SPA
Site Code: 004175

Site information

Relevant qualifying interests: Northern fulmar (*Fulmarus glacialis*), European storm-petrel (*Hydrobates pelagicus*), herring gull (*Larus argentatus*), lesser black-backed gull (*Larus fuscus*), Manx shearwater (*Puffinus puffinus*), red-billed chough (*Pyrrhocorax pyrrhocorax*), Arctic tern (*Sterna paradisaea*)

Site Name: Deenish Island and Scariff Island SPA
Site Code: 004175

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: northern fulmar (*Fulmarus glacialis*), Manx shearwater (*Puffinus puffinus*)

Summary Conservation objectives:

- To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA (above)

Feature attributes and targets defining favourable conservation status:
Not listed - https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004175.pdf

Closest distance (km) to the survey: 162km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
Fulmar and Manx shearwater have the potential to forage within range of the survey area (see Thaxter *et al.* 2012). Sensitivity to vessel movements is considered to be low for those species (see Garthe & Hüppop 2004, MMO 2018, Fleissbach *et al.* 2019), but in view of the potential for interaction, this is considered further in Section 4.2.1.

Underwater noise from vessel and survey activities
There is the potential for interactions between diving seabird species (Manx shearwater) which are potentially sensitive to underwater noise, and the survey activities. This is considered further in Section 4.2.2.

Site Name: Kerry Head SPA
Site Code: 004189

Site information

Relevant qualifying interests: peregrine (*Falco peregrinus*), northern fulmar (*Fulmarus glacialis*), red-billed chough (*Pyrrhocorax pyrrhocorax*)

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: northern fulmar (*Fulmarus glacialis*)

Summary Conservation objectives:

- To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA (above)

Feature attributes and targets defining favourable conservation status:
Not listed - https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004189.pdf

Closest distance (km) to the survey: 275km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
Fulmar, while having the potential to forage within range of the survey area (see Thaxter *et al.* 2012), are regarded to have a low sensitivity to shipping traffic (Garthe & Hüppop 2004, Fleissbach *et al.* 2019). However, in view of the potential for interaction, this is considered further in Section 4.2.1.

Underwater noise from vessel and survey activities
None of the qualifying interests are diving seabirds which are likely to be most at risk of any underwater noise effects, and therefore no interactions with the survey are considered to be possible.

Site Name: Skomer, Skokholm and the Seas off Pembrokeshire / Sgomer, Sgogwm a Moroedd Penfro SPA
Site Code: UK9014051

Site information

Relevant qualifying interests: Atlantic puffin (*Fratercula arctica*), Manx shearwater (*Puffinus puffinus*), European storm-petrel (*Hydrobates pelagicus*), lesser black-backed gull (*Larus fuscus*), red-billed chough (*Pyrrhocorax pyrrhocorax*), short-eared owl (*Asio flammeus*)

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: Manx shearwater (*Puffinus puffinus*), lesser black-backed gull (*Larus fuscus*)

Summary Conservation objectives:
Only draft conservation objectives are presently available for the site**:**
https://cdn.naturalresources.wales/media/675733/skomer-skokholm-and-seas-off-pembs-pspa-draft-conservation-objectives-final.pdf?mode=pad&rnd=131625760740000000

Closest distance (km) to the survey: 131km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
Lesser black-backed gull and Manx shearwater have the potential to forage within range of the survey area (see Thaxter *et al.* 2012). Sensitivity to vessel movements is considered to be low for those species (see Garthe & Hüppop 2004, MMO 2018, Fleissbach *et al.* 2019), but in view of the potential for interaction, this is considered further in Section 4.2.1.

Underwater noise from vessel and survey activities
There is the potential for interactions between diving seabird species (Manx shearwater) which are potentially sensitive to underwater noise, and the survey activities. This is considered further in Section 4.2.2.

Site Name: Grassholm SPA
Site Code: UK9014041

Site information

Relevant qualifying interests: Northern gannet (*Morus bassanus*)

Qualifying interests identified for further consideration on the basis of a foreseeable interaction with the survey area: Northern gannet (*Morus bassanus*)

Summary Conservation objectives:
The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

- The population will not fall below 30,000 pairs in three consecutive years,
- It will not drop by more than 25% of the previous year's figures in any one year.
- There will be no decline in this population significantly greater than any decline in the North Atlantic population as a whole.

https://naturalresources.wales/media/674134/Grassholm%20SPA%20Management%20Plan%2021%5B1%5D.4.08%20(English).pdf

Closest distance (km) to the survey: 173km

Consideration of site interest features against potential sources of likely significant effect

The physical presence of survey vessel
Northern gannet has the potential to forage within range of the survey area (see Thaxter *et al.* 2012). Sensitivity to vessel movements is considered to be low for those species (see Garthe & Hüppop 2004, MMO 2018, Fleissbach *et al.* 2019), but in view of the potential for interaction, this is considered further in Section 4.2.1.

Site Name: Grassholm SPA **Site Code: UK9014041**
Underwater noise from vessel and survey activities There is the potential for interactions between diving seabird species (northern gannet) which are potentially sensitive to underwater noise, and the survey activities. This is considered further in Section 4.2.2.